

1955

Perception of Ambiguous Stimuli in Motion: a Comparison of Schizophrenic and Normal Adults With Normal Children.

Frank Joseph Loeffler Jr

Louisiana State University and Agricultural & Mechanical College

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PERCEPTION OF AMBIGUOUS STIMULI IN MOTION: A COMPARISON
OF SCHIZOPHRENIC AND NORMAL ADULTS WITH NORMAL CHILDREN

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Psychology

by
Frank Joseph Loeffler, Jr.
A.B., University of Illinois, 1949
M.S., University of Illinois, 1951
June, 1955

EXAMINATION AND THESIS REPORT

Candidate: Frank J. Loeffler

Major Field: Clinical Psychology

Title of Thesis: Perception of ambiguous stimuli in motion: a comparison
of schizophrenic and normal adults with normal children.

Approved:

J. M. Richards

Major Professor and Chairman

Richard J. Russell

Dean of the Graduate School

EXAMINING COMMITTEE:

Walter H. Matthews

Graham B. Burt

Paul C. Young

Samuel B. Bass

E. Cordelia Brown

Date of Examination:

September 19, 1954

ACKNOWLEDGMENTS

The writer wishes to acknowledge the assistance and cooperation he has received from many individuals.

To Dr. Thomas W. Richards, for his suggestion of the original problem, and for his direction and guidance throughout the entire investigation, the writer expresses his sincere appreciation.

To Dr. William H. Lundin, for his interest in this study as demonstrated by his permission for the writer to use data previously reported in his own dissertation, and by his willingness to score a number of test records independently, the writer is especially grateful.

For their aid in selecting and making available appropriate subjects for this investigation, the writer also is indebted to Miss Marie Hundemer, Director of the Convention Child Care Center; Miss Patricia Berg, Director of the Day Camp of the Girl Scouts of America; Mr. B. W. Wax, Director of Boys' Academy; Mr. E. B. Davis, General Secretary of the Baton Rouge YMCA; Dr. Perry Davis, Guidance Counselor of a southeastern Louisiana high school; Mr. J. E. Carpenter, Captain of substation 9, Baton Rouge Fire Department; and Dr. S. H. Colvin, Clinical Pathologist of a southeastern Louisiana hospital.

Finally, the writer wishes to express his gratitude to members of the faculty and graduate students in the Department of Psychology, especially Dr. Graham B. Bell, Mr. Frank Farese, and Mr. Clifford Brackenridge, for helpful suggestions and criticisms.

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ABSTRACT

Schizophrenia often is termed a regressive disorder, but experimental studies of the past have been contradictory in the support they have contributed to this hypothesis. The present investigation sought to demonstrate regressive phenomena in two types of schizophrenia. A secondary objective was to examine developmental trends on the Projective Movement Sequences test.

Specifically, the expectations as to the manner in which the groups might perform were formulated on the basis of the writer's calculations of data obtained elsewhere by Lundin from schizophrenic and presumably healthy adults. The logic was as follows: If the regression hypothesis is correct, then, in those instances where the pathological and normal adult groups differed significantly from one another, individuals of lower chronological age should perform in a manner not statistically different from the pathological groups.

Three child groups and one normal adult control group were tested with the same instrument (Projective Movement Sequences) used with the adult populations from which the expectations were derived. One group studied was composed of children aged three to five years, another of children aged nine to ten years, the next of adolescents aged fifteen to sixteen years, and the last of adults. These particular age levels were selected since they represented; first, the youngest group which might adequately be tested; second, the oldest group in an age range that could be considered still preadolescent; third, a group

in the middle of adolescence, and, fourth, a group of adults of an age not statistically different from the groups used by Lundin. An effort was made to select the experimental groups so that they would be similar to the groups from which the expectations were formulated in terms of socioeconomic status. Finally, all the groups tested by the writer were equated so far as possible with respect to intelligence. These latter two aims were accomplished by means of the Warner Scale of Social Status and the Ammons Full-Range Picture Vocabulary Test.

In all, ten expectations were formulated as to the manner in which the children might behave with respect to the test instrument. Eight of the ten expectations were supported. This was taken as suggestive evidence for the applicability of the regression hypothesis as applied to schizophrenia.

Developmental trends were investigated empirically. On the majority of scoring variables considered, development appeared to be a simple growth function of age.

This investigation led to the following conclusions: First, the regression hypothesis, as applied to schizophrenia, may be in need of modification. While there was a tendency for older children to respond in a manner not very different from schizophrenics, the regression was not to as low a level as would have been expected by theory. Second, in terms of the structural scoring categories for the test instrument, development appeared nearly complete by the ages of nine to ten. The major difference between child and adult seemed to be in terms of

the greater variety of experiences the adult could choose from in verbalizing his interpretations.

CHAPTER I

INTRODUCTION

There recently has been an increased amount of interest shown in the developmental approach to personality (7, 38, 44), particularly as it is associated with the projective techniques (1, 10, 15, 18, 19, 21, 28). Concomitant with this emphasis, and closely allied with the projective movement, has developed, perhaps, an even greater interest centering about individual differences in perception as typified by the books of Blake and Ramsey (5), Bruner and Kretch (8), and Witkin, et. al. (45). In some instances (38, 44, 46), these viewpoints were explicitly raised as objections to what the proponents of developmental and perceptual approaches feel to be the static course of stimulus and response concepts that psychologists have been pursuing. Although these writers do not minimize the importance of such studies for general psychology, particularly in the area of learning theory, they do feel more progress might be obtained in personality theory by means of experiments fashioned in accord with principles of dynamic development.

Directly influenced by the above orientations, an integrated series of studies (47) have been conducted within the framework of psychoanalysis and Werner's (42) genetic psychology. These several studies utilized the Rorschach technique as a method for isolating a dimension by means of which genetic development and its reversal in

the behavior disorders might be demonstrated. These studies, conducted at the Cushing Veterans Administration Hospital, were presented in a symposium at the 1952 meeting of the American Psychological Association in Washington, D. C.

Friedman (17) investigated the hypothesis that "schizophrenic patients, in the structural aspects of their perception, function at a genetically lower level, similar to, but not identical with, that of young children" (p. 171). The Rorschach Test was administered to 30 patients with a schizophrenic psychosis, 30 normal children, and 30 normal adults. Analysis was made of a variation upon the usual location scores, number of responses, number of items perseverated, and number of content categories used. All three groups were then compared with one another on the above variables and significances of differences tested by means of Chi square. The hypothesis offered was felt to be supported in that the schizophrenic behaved on the Rorschach Test in many scoring categories in a manner not significantly different from the child although certain vestiges of higher level functioning were identifiable.

Following Friedman, Hemmendinger (19) used the same scoring schema and traced the development of immature (undifferentiated) to mature (differentiated) responses to the Rorschach as found in groups of children from ages three to eleven. In addition, he compared the responses of Friedman's normal adult group with those of the children. Support is found for his hypothesis that perception progresses "through a process of differentiation and integration, a separation of discrete

functions and ... into an integrated pattern of distinct visual processes, characterized as discrete, articulated, definite, flexible, and stable" (p. 162).

Siegel (36) re-examined the notions brought forth in Friedman's study, adapted his methodology, and tested the assumption that paranoid patients, in contrast with other schizophrenic groups, maintain a relatively greater intactness of personality and that perceptual phenomena typical of differing levels of impairment in pathology would be found to correspond with different perceptual levels on a genetic scale" (p. 151). Friedman's Rorschach protocols for his 30 schizophrenic patients and 30 normal adults, and Hemmendinger's data on 137 children of various age levels were supplemented with 30 records of paranoid schizophrenic patients collected by Siegel. His major hypothesis was felt to be supported in that the perceptions of the paranoid patient frequently corresponded to a later stage of development than the hebephrenic and catatonic schizophrenics, but on a lower level than of the normal adults.

These results stand in some contrast to earlier studies of regression in schizophrenia. Influenced largely by Piaget's (33) claim that the thinking of the schizophrenic is located midway between the autistic thinking of the child and the logical thinking of the normal adult, Cameron (9), for example, compared schizophrenic patients with normal adults and children in terms of levels of thinking. Piaget's method of incomplete sentences was used, and the analysis was in terms of: (a) causal relationships, for which the subject was required to

complete a sentence ending with "because," (b) relationships of discordance or antithesis, for which the subject was required to complete a sentence ending with "although," (c) asyndetic thinking, or associations without explicit coordination, (d) metonymic distortion, the substitution of an approximate term or phrase, and (e) interpenetration of themes. As a result of his findings, Cameron concludes that "increasing disorganization does not result in the schizophrenic adult's retracing in the reverse direction those phases which characterized the development of his reasoning in childhood" (9, p. 6).

DuBois and Forbes (12), measuring the frequency with which catatonics adopted a foetal position during sleep, demonstrated no differences from a control case. This study, however, has been frequently criticized since only a single control case was utilized and, thus, it is impossible for one to generalize from their findings.

On the basis of results such as these, Sears (35) feels that experimentation does not justify the hypothesis that schizophrenia is a regressive disorder. Hunt and Cofer (20), however, provide a possible clue for the reconciliation of contradictory results:

If one conceives regression as back-tracking over inexorable steps in a developmental process, Cameron has shown that such a conception of schizophrenic thinking fails. On the other hand, if one interprets regression as either the reappearance of older tendencies when newer ones are extinguished ... or the reversion to "simpler levels of creative activity" under the influence of frustration, ... the behavior of the immature and the regressed could not be expected to be alike in all aspects, and Cameron's evidence fails to apply (p. 1018).

Notwithstanding the controversial status of the theory that schizophrenia is a regressive disorder, the reality of regressive

phenomena has been amply demonstrated, particularly in animal experiments (27, 29, 32, 35). And on a human level, Barker, Dembo, and Lewin (4), manipulating a free play situation with preschool children, found that primitivation (regression) occurred in response to frustration.

Development of the Problem

Because schizophrenia so often is termed a regressive disorder (11, 14, 16, 31, 32, 39), and since experimental results of the past have been contradictory in the support they have given this hypothesis, further study in this area seemed profitable. In addition, with the exception of the series of investigations initially reviewed in this paper, few studies utilized more than one age group of children with which to contrast and compare their adult and schizophrenic populations. The present investigation is an extension and revision of an earlier report submitted by this writer to his doctoral committee, and incorporates the recommendations made by them on the basis of the preliminary results.

The writer's earlier study, on the basis of specific predictions formulated directly from the regression hypothesis, sought to demonstrate regressive phenomena in two types of schizophrenic reactions. A secondary but perhaps no less important objective was to examine developmental trends in the perception of movement in a series of ambiguous stimuli administered in the form of motion pictures.

Specifically, the predictions were formulated on the basis of the writer's calculations of data obtained elsewhere by Lundin (24, 25) from schizophrenic and presumably healthy adults. The logic was as follows: If the regression hypothesis is correct, then, in those instances where the pathological and normal adult groups differed significantly from one another, individuals of a lower chronological age should perform in a manner not significantly different from the pathological groups.

Two child groups of 25 subjects each were tested with the same instrument (Projective Movement Sequences Test) used with the adult populations from which the predictions were formulated. One group studied was composed of children aged three to five years, and the other of children aged nine to ten years. These particular age levels were selected since they represented, first, the youngest group which might adequately be tested and, second, the oldest group in an age range that could be considered still preadolescent. An effort was made, in addition, to select the child groups so that they would be similar to the adult groups and to one another in terms of socioeconomic status. Finally, both child groups were equated so far as possible with respect to intelligence. These latter two aims were accomplished by means of two scales; the Warner Scale of Social Status (41), and the Ammons Full-Range Picture Vocabulary Test (2, 3).

In all, 26 specific predictions were formulated as to the manner in which the children might behave with respect to the experimental variable. Of the 26 predictions, 20 were substantiated. This was

taken as suggestive evidence that regression does occur in the schizophrenic disorders. The results further indicated that the regression hypothesis, as applied to schizophrenia, may be in need of modification; regression appeared to be to the preadolescent, or a later period rather than to an infantile level as would have been expected by orthodox theory.

Development of perception, as measured by the test instrument, appeared to be fairly near completion by the ages of nine or ten. As measured by this technique, development was found not always to be a simple growth function of age but, on many of the scoring variables, appeared to demonstrate a curvilinear relationship to age.

Purpose of the Study

The present investigation will seek to demonstrate the depth of regression in two types of schizophrenic reactions on nine scoring categories of the test instrument. It will also endeavor to examine developmental trends on nine additional scoring variables as well as present some normative data of a more qualitative character. The method for accomplishing these aims will be presented later in this section and in the next section.

Major Variables of the Problem

The Projective Movement Sequences Test (PMS)

The test utilized in this investigation constitutes the independent variable and was presented in a standard fashion as described

in the second section. Since administration was not varied, it need not be considered further at this point.

Populations Studied

Adult groups. Data on the two pathological groups and one adult control group were collected in a midwestern city.¹ These control and pathological groups were equated on the basis of socioeconomic status, age, and education. No significant differences were found to obtain between the groups on these variables. Matching on further variables was felt not to be feasible (24).

An additional adult control group was tested by this writer. The data for these adults were collected in a southern city considerably smaller than the one in which the above material was gathered. The southern adult control group was equated, as much as possible, with the northern group for socioeconomic status and age, and with the child groups for intelligence. No significant differences were found to obtain between the adult groups on the variables considered.

Child groups. Records for the three groups of children were obtained in two southern cities. This constitutes the greatest limitation of this investigation and will be discussed in more detail in the second section. The child groups, however, were equated with the adult

¹The writer is greatly indebted to Dr. William H. Lundin for permission to use the data previously reported in his doctoral dissertation (24), and for his generous assistance in supplying original data to make compilation easier.

populations in terms of socioeconomic status as measured on the same scale as was used for the adult groups (41). In addition, an attempt was made to equate the three child groups with the southern adult control group in terms of intelligence by means of standardized tests of intelligence.²

Theoretical Orientation

As Ames (1) indicates, the developmental point of view suggests that behavior progresses through a sequence of stages. Psychoanalysts, especially, speak of these stages as levels of psychosexual development and ascribe certain definite characteristics to each of them (14, 16, 30, 40). Disturbances may result in an arresting of development at any stage of personality formation, or may cause the retention of an abnormal number of characteristics of an earlier state to which the individual will return if difficulties arise. This return to a previous mode or level of psychosexual development is termed regression and is considered by some (43, 46) to be development of reverse.

For the purpose of this paper, Shakow's (37) definition of regression will be used since it is one of the more operational. He defines regression as "the reversion to a channel of expression belonging to a phase of personal development earlier than indicated by the

²The Ammons Full-Range Picture Vocabulary Test was used for this purpose for all groups with the exception of the adolescent group. Since the adolescent subjects were tested within a high school situation, the school had California Test of Mental Maturity (49) scores for each subject which were generously made available to the writer.

chronological and/or mental age of the person" (pp. 383-384). And, as many writers indicate (6, 14, 16, 30, 40), progress and regression in the psychosexual area is never complete so that it would not be expected that the regressed individual would be identical with a person who would be expected to be functioning at a lower level of psychosexual development because of chronological and/or intellectual immaturity.

Method of Selecting Scoring Variables for Investigation

Since no data of a developmental nature are available for the Projective Movement Sequences Test,³ and because the psychological meaning of the various scoring categories is, as yet, unknown, this study will limit itself to scoring variables on which differences between the pathological and normal groups, or only between the pathological groups have been found to exist. That such a step is legitimate can be defended on the basis that regression often is viewed as development in reverse. Hence, with those scoring variables on which the pathological and normal groups differed, the expectation is that the responses of the pathological groups represent a lower level of development than the responses of the adult control group. Further, it is expected in such cases that the responses of the undifferentiated

³Through a personal communication with Dr. T. W. Richards, the writer is aware of one study which was conducted on the aging process. The reference is, "Colgin, R. W. The influence of age and intelligence upon imaginative productions in the Projective Movement Sequences test. Unpublished doctoral dissertation, Northwestern University (Evanston, Illinois), 1953." This investigation concerned itself with advancing age rather than with the levels of childhood or adolescence.

schizophrenic patients will correspond to an earlier level of development than the responses of the paranoid schizophrenic patients. The logic underlying this step is that the paranoid patient is alleged not to regress as far as (is fixated at a later stage of psychosexual development than) the undifferentiated schizophrenic (6, 14, 16, 32, 36, 39).

Strictly on the basis of Cameron's (9) results, the above formulation would not appear to be prejudicing the expectations since he found that, while normal adults and adult schizophrenic patients differed in levels of thinking, the schizophrenics did not necessarily differ in the direction of childish norms.

More specifically, the expectations were formulated on the basis of the writer's calculations from Lundin's data by means of the Chi square methods reported in the second section. From this re-analysis of the adult protocols, differences significant to at least the .05 level of confidence emerged between the sample populations on nine scoring variables. The statistics for these scoring variables are presented in the third section.

Scoring variables for the investigation of development were selected in a fashion similar to that used for the study of regression. An overall Chi square analysis between all normal groups was made of every scoring variable and combination of scoring variables, and only those were selected whose probability value was at least at the .05 level of confidence. The statistics for these scoring variables also are presented in the third section.

CHAPTER II

PROCEDURE

Since the Projective Movement Sequences Test (PMS) is a relatively new technique, a fairly detailed description of the test will be provided before the populations and general design of the study are presented. The descriptions are from Lundin's doctoral dissertation (24), and a complete analysis of the various dimensions can be found in that source.

Projective Movement Sequences Test

Description of the Test

The PMS is composed of a series of eight sequences made by photographing black iron filings moved by magnets from underneath a platform. The particular movements followed in each sequence were planned prior to the photographing. In addition, some sequences were photographed in sharp focus, others in diffuse; some had strong side lighting, others had flat overhead lighting; some were developed as positive prints, others as negatives; and, in some, the movement projected is the reverse of the manner in which it had been photographed.

Administration of the PMS

The test is individually administered by means of a 16 mm. projector set to run at its slowest speed. The image can be projected on almost any convenient surface in a semi-darkened room. In accordance

with the manner in which Lundin's data was collected, the present study also kept the size of the projected image close to 20.5 x 22 inches. Each subject was seated approximately two feet directly to the right of the projector and about ten feet from the screen. The image was projected at eye-level for all subjects.

All subjects were given instructions which contained the essential elements of the original set which follows, but modified somewhat in keeping with the chronological age of the subject:

I am going to show you a movie. In the movie you will see eight short scenes or sequences. I will show you one scene at a time. Watch the scenes carefully. When the first scene is over, I will stop the projector. Then I want you to tell me what you saw in the movie and what was going on, or taking place. Do not say anything about the scene until it is all over. We will do the same thing for each scene, watch it first, and then tell me what you saw and what was going on (24, P. 27).

To these instructions was added the comment that there are no right or wrong answers; that the examiner was interested only in what the pictures looked like to the subject. In so doing, the examiner attempted to enlist the subject's cooperation by making each feel his importance as part of a project to establish norms for subjects of his own age and sex.

Following the spontaneous associations, an inquiry was given in order to elicit sufficient information for appropriate scoring. In addition, each subject was asked, "Was that all?" in order to insure optimal production without using specific leading questions.

At the conclusion of each test administration, the subject was

requested not to tell anyone else what he had seen. He was informed, however, that if anyone should ask, it was permissible to tell that he had seen some movies for which he had to use his imagination. This latter instruction was felt to be useful in taking care of situations where the subject might otherwise be extensively questioned by an insecure peer and possibly placed on the defensive.

Method of Scoring

Direction of movement. Direction of movement can be scored as diverse, flexor, or extensor. In brief, diverse movement (DM) is "any motion whose direction is primarily random or inconsistent..." (p. 27). Flexor movement (FM) is "motion whose ultimate direction is determined by a centripetal force" (p. 27). Extensor movement (EM) is "motion whose ultimate direction is centrifugal in nature" (p. 28).

Change of concept. The shifting of concepts within a sequence is termed change of concept (ch). This is defined more specifically as follows:

This refers to the number of different concepts seen for the same forms. It does not refer to the numeration of separate objects which are all present simultaneously in the scene, nor should it be scored when the subject offers alternative names for objects which are generically close, such as "a bird or a swallow," or "a snake or a caterpillar." It should be scored in all those instances where alternative concepts are offered for the same figure, and/or where a concept is changed during the course of the exposition (pp. 28-29).

Level of movement. Four levels of movement are scored. Level I refers to objects seen as moving as the result of an internal source of

energy, and in Level II as a result of an external source of energy.

Level III refers to static movement where movement is denied or, at least, not verbalized, and Level IV includes movement in which objects are seen as disintegrating.

Two types of sub-movements are distinguished within Level I:

(a) movement can have a volitional¹ quality such that the figure in motion acts upon the basis of an awareness of some need or desire...;

(b) internally precipitated movement can also be non-volitional when it covers the activities of growing plants, chemical reactions, physiological or bodily processes, etc. (p. 30).

Content. The type of content occurring within each movement level is also scored. These categories include human, animal, animate (in which human or animal qualities are ascribed to anything other than human or animal), botanical, physiological, nature, chemico-physical, machines, and inanimate objects not included in the above.

A second type of content is abstracted from various content categories and is scored as anal. In this is included "only the following types: 'mud, dirt, bowel movement, feces, intestines with something inside'" (p. 70).

Reliability of Scoring

Ten records obtained by the writer were submitted to the author of the PMS and scored independently by him.² The results for every

¹Italics mine.

²The writer is very grateful to Dr. William H. Lundin, for the time-consuming job of scoring ten protocols for all scoring variables.

scoring variable used in this study are provided in Table I. To facilitate possible referral to this table, the variables are presented in the same order as they are discussed in the third section.

In one instance, a scoring variable (Physiological in I) was not scored in any of the ten records, but an estimate of reliability can be gained from the total score on that variable. In another instance (Total Chemico-physical), no estimate of reliability can be obtained since not one subject made use of the category. It might be said, nevertheless, that the two scorers agreed perfectly in agreeing not to score that variable.

Results of the analysis of scoring reliability indicate that the writer agreed very well with the author of the PMS and, therefore, that comparisons can be made validly between the child groups (whose records were scored by the writer) and northern adult groups (whose records were scored by the author of the PMS).

Experimental Populations

Seven groups of 25 individuals each were obtained and tested in the manner described above. Both male and female subjects were included within each of the seven groups. Four of the groups were composed of adult populations and three of children. Two of the four adult groups were samples of pathological disorders, but all of the remaining populations were composed of presumably normal subjects. The two pathological groups were made up of hospitalized patients diagnosed either as paranoid or undetermined schizophrenics.

TABLE I

RELIABILITY OF SCORING FOR ALL PMS VARIABLES

UTILIZED: PERCENTAGE OF AGREEMENT

SCORING VARIABLES	Scoring Instances	Agreements	Subjects Responding
Human in I	(Infrequently scored. See "Total Human.")		
Nature in I	(Infrequently scored. See "Total Nature.")		
Total Nature	4	4	3
Change of Concept	6	6	4
Total Inanimate	13	10	7
Animal in IV	7	7	3
Movement Level IV	15	12	5
Physiological in I	(Infrequently scored. See "Total Physiological.")		
Total Physiological	5	4	3
Inanimate in II	3	3	2
Total Human	5	4	3
Total Chemico-Physical	(Never scored.)		
Movement Level I	41	31	7
Movement Level II	20	16	5
Flexor Movement	19	17	4
No. Content Categories	38	37	10
No. Scorable Responses	116	106	10
Movement Level III	15	12	8

Percent Agreement = 88

Adult Populations

Three of the four adult populations were obtained in a large midwestern city. These three groups were matched on the basis of socioeconomic status, age, and education. No significant differences were found to obtain between the three groups (24). The fourth adult sample was gathered in a small southern city and equated with the northern populations on socioeconomic status and age. Again, no significant differences occurred between the groups. The results of these comparisons are found in Tables II and III.

Pathological groups. Adequacy of the diagnoses for the subjects in the pathological groups was based on seven criteria. Each patient included in this sample had to have been tested by a battery of psychological tests, given a complete psychiatric examination, been of at least dull-normal intelligence, free of organic brain disease, of the white race, tested before treatment began, and received the same diagnosis in the final staff evaluation as was achieved by means of psychological tests (24).

Control groups. Inclusion of an adult in the northern control sample was evaluated on the basis of three criteria; work history, marital status, and health history. Hence, no person was included in the group who had changed jobs frequently, had married late in life or had been separated or divorced, had chronic illnesses of a minor nature which necessitated much absenteeism, or had suffered any kind of traumatic physical illness. While the use of these criteria means that

TABLE II

MEASURES OF CENTRAL TENDENCY AND DISPERSION FOR
 SCORES ACHIEVED BY VARIOUS GROUPS ON THE WARNER
 SCALE OF SOCIOECONOMIC STATUS

GROUPS	Median	Range	Mean	Standard Deviation
3 to 5 year olds	59.79	43-71	58.08	6.38
9 to 10 year olds	58.31	33-71	55.68	10.48
Southern adolescents	57.80	44-65	55.88	6.18
Southern adult controls	57.08	40-65	55.84	6.42
Northern adult controls	59.00	43-67	57.76	6.30
Undifferentiated schizophrenics	61.60	39-68	59.40	6.02
Paranoid schizophrenics	62.00	47-70	59.84	7.04

TABLE III
MEASURES OF CENTRAL TENDENCY AND DISPERSION
FOR AGES OF SUBJECTS IN THE ADULT GROUPS

GROUPS	Median	Range	Mean	Standard Deviation
Southern adult controls	28.00	21-53	33.09	9.84
Northern adult controls	32.00	19-55	31.40	8.82
Undifferentiated schizophrenics	31.67	21-50	32.68	8.08
Paranoid schizophrenics	37.25	18-55	36.88	8.63

the control group was not matched with the pathological groups on these variables, the criteria did serve to eliminate some subjects who may possibly have been suffering from some, as yet undiagnosed, mental disorder and, hence, spuriously reduced the significance of the results (24).

Inclusion of an adult in the southern sample was determined on the basis of socioeconomic status, age, and intelligence. This was to insure, so far as possible, the equivalence of all groups except on the variable of pathology. The southern control adults were not matched with their northern counterparts on work history, marital status, or health history. It has been suggested that such criteria delimit an "abnormally normal" population and that it might be best to use freedom from hospitalization as an overall criterion.³

Child Populations

All three child populations were obtained in two southern cities much smaller than the one in which the northern adult data was collected. This constitutes the major limitation of this study since it remains uncertain as to the differences in performance on the PMS which might be attributed to regional as well as urban differences. However, a southern adult control sample was obtained and their responses compared with those of the northern adult control sample. Since no significant

³The writer wishes to express his appreciation to Dr. Graham B. Bell for this observation. Since the pathological groups included people who were unmarried, had sporadic work histories, and so forth, the northern controls might have differed, at times, on these variables rather than on the variable of mental illness.

differences occurred between the two adult control samples on any of the scoring variables used in this study, and since this writer's scoring was in very close agreement with the individual who scored the northern adult samples, it is felt that this was not a too serious limitation.

The children used in this study were nursery, elementary, and high school children of approximately average intelligence, and of a socioeconomic background not statistically different from that of the adult groups. No emotional disorder was evident to anyone charged with their care. Comparisons of the groups on socioeconomic status are indicated in Table II, and comparisons of child and southern adult control groups on intelligence in Table IV. Significances of differences were calculated by means of the Chi square test reported below.

It is seen that there were no differences between the groups in terms of socioeconomic status. There were differences, however, between the southern groups in intelligence as measured by means of two standardized tests. It is observed that the adolescent group scored the lowest of any of the groups, and the nine to ten year old children the highest. The difference is significant to at least the .001 level of confidence. At least a portion of this difference might be accounted for in terms of a difference in tests; the adolescents received the California Test of Mental Maturity (49), while the others were administered the Ammons Full-Range Picture Vocabulary Test (2, 3). None of the other groups differed significantly from one another. It is not felt that the obtained difference constitutes a serious limitation of

TABLE IV

MEASURES OF CENTRAL TENDENCY AND DISPERSION FOR IQ
 RATINGS ACHIEVED BY THE SOUTHERN GROUPS ON INTELLIGENCE*

GROUPS	Median	Range	Mean	Standard Deviation
3 to 5 year olds	108.67	84-143	108.92	11.56
9 to 10 year olds	111.50	97-137	113.44	9.56
15 to 16 year olds	101.75	91-122	102.24	7.22
Southern adult controls	107.00	91-120	105.00	8.12

*The adolescents (15 to 16 year olds) were given the California Test of Mental Maturity. The remainder were administered the Ammons Full-Range Picture Vocabulary Test.

the investigation. First, the largest difference occurring between any two groups is only a matter of less than ten IQ points and, for all practical purposes, they may be considered equivalent. Second, granting that the statistical differences in intelligence have psychological meaning, it merely indicates that the groups concerned are somewhat older and somewhat younger in mental age than is denoted by their chronological ages.

Scales Used to Equate Groups

The socioeconomic scale used here is the Warner Scale (41), and is the same as the one used for the northern adult sample. Ratings of one through seven are made on each of the following variables; (a) occupation, (b) source of income, (c) house type, and (d) dwelling area. Each of the variables is differentially weighted and a total score obtained which serves as an index of socioeconomic position. As Warner suggests, ratings on occupation and source of income were computed for each child on the basis of the principle wage earner in the family. Ratings on house type and dwelling area, with the exception of those for the adolescent group, were made by the writer on the basis of actual observation.⁴ The index scores⁵ which were thus obtained indicate that both the median and mean person in each of the seven groups is a member of the upper-lower class.

⁴The writer wishes to express his appreciation to Dr. Perry Davis, who was able to furnish this data on the adolescent subjects.

⁵See Table C of Appendix B for the actual total weights determined for each subject.

Intelligence was measured by means of the Ammons Full-Range Picture Vocabulary Test, Form A (2, 3), on all subjects except those in the adolescent group. This is a rapidly administered test for which the authors claim high reliability and a high correlation with the Stanford-Binet vocabulary subtest. Separate norms are available for white children and adults as well as for those of Negro and Spanish descent. In this test, the subject is simply required to point to the picture which represents the word spoken by the examiner. The total number of correct responses are then tallied and the score converted to a mental age.⁶

Treatment of the Data

All differences were analyzed for their statistical significance by means of the Chi square test. Adopting Leslie's (22) method of computation, an overall Chi square test was made using all of the groups concerned in order to determine whether or not any real differences existed within each scoring variable; i.e., a Chi square test was performed on all adult groups when selecting variables to be used in the study of regression, and on all presumably normal groups when selecting variables to be used in the investigation of development. Then, whenever this method indicated a difference significant to at least the .10 level of confidence, those groups demonstrating the greatest difference were taken two at a time and subjected to further

⁶See Table D of Appendix B for the actual scores obtained by each subject.

Chi square analysis until no further differences significant to at least the .10 level of confidence emerged.

Two uniform procedures were used throughout. First, when the percent responding of the groups to be compared was less than 75, the cell values simply became the number of subjects responding versus the number not responding to that scoring category.⁷ Second, when more than 75 percent of the groups to be compared responded on a scoring variable, combined distributions of the groups to be compared were constructed and a median obtained. With this median as a "cutting point," a table was constructed and the groups compared for the number of cases having scores above and below this point (17, 27). Adopting the null hypothesis, one would state that in each of the groups to be compared, the number of cases lying above and falling below the "cutting point" are equal, or nearly equal; that is, that the Chi square value would be zero or close to it. When the chances in one hundred that the observed size of the Chi square value could occur by chance are very few, the null hypothesis can be discarded. For the purpose of this paper, the .10 level of significance is taken as sufficient reason for its rejection. As suggested by McNemar (27), Yates' correction for continuity was applied in all cases where an expected cell frequency value fell below ten. Probability values were taken from the tables of Yule and Kendall (48) since their tables present the probability for obtaining Chi squares as large as specified values expressed as integers.

⁷The writer wishes to acknowledge his indebtedness to Dr. Bernard M. Bass, for his suggestion of this method of analysis, and for his recommendation of Leslie's method of computation.

CHAPTER III

RESULTS

Comparisons between the experimental groups are presented in this section. Provided first is a qualitative description of the manner in which the southern samples reacted to the test instrument. Following this are given the results concerned, first, with the study of regression and, second, with the study of development. Next, sex differences in response on certain scoring variables are provided. In all instances, statistical tests of significance were computed as described in the second section. Finally, a summary of responses which frequently occur at various age levels is presented.

Behavior of Southern Populations on the Projective Movement Sequences Test

The PMS proved to be an extremely easy test to administer to children as young as three years of age. In part, this may have been the result of a preliminary explanation period provided the children by the person in charge. In addition, since not all of the children within the groups from which the subjects were chosen could be tested, the testing session was presented by the teacher or leader as a privilege. Hence, many of the children, especially the older ones, were enthusiastic to the "pictures" and attempted to compete for the opportunity to view them.

Within the actual testing session, nearly all the subjects were extremely cooperative. The few exceptions were found in the younger

group, but even those were sufficiently willing to enable the writer to obtain a complete protocol. For the most part, the children appeared to enjoy the experience and felt it was "fun to use" their "imagination on the movies." The predominant difficulty faced, actually, was of a very minor nature. A few subjects, even adults, experienced some difficulty in determining what they were expected to do after the first sequence. After they were reassured that it was expected only that they report what the images looked like to them, and that others had reported things which would probably have sounded very "foolish" to them, no further difficulty generally was experienced.

Equivalence of Adult Control Groups

No significant differences occurred between the northern and southern normal adult control groups on any of the variables used in this investigation. Because of their similarity to one another, it was possible to combine the two groups when making statistical comparisons between presumably normal adults and all other groups. This was done for two reasons; first, the increase in number of subjects within the single normal adult group theoretically tends to give greater stability to the statistics performed (27) and, second, the combination eliminated a comparison between the two normal adult groups which were not statistically different and all other groups. Medians, means, ranges, and standard deviations for both groups of control adults on all scoring variables are presented in Tables D and E of Appendix C.

Regression

Table V lists the medians and percent of each group responding for each of the nine scoring variables which demonstrated significant differences between the adult populations. The Chi square and probability values for Table V are found in Table VI. Following the overall Chi square tests, groups were taken two at a time and subjected to further Chi square analysis in order to locate those groups which differed significantly from one another. The results of these analyses will be presented below.

Regression on Scoring Variables which Demonstrated an Increase in Use with Age

The data for those scoring variables whose use increased with age are presented in Figure 1, and Table VII. The results may be summarized as follows:

Human percepts within Movement Level I. The undifferentiated schizophrenic patients did not differ significantly from the normal adult controls and, therefore, regression cannot be demonstrated for them. However, as seen in Figure 1A, and Table VII, the paranoid schizophrenic patients reported fewer humans moving as a result of their own volition than did the adult controls (.09 level of confidence). The paranoids did not differ significantly from the nine to ten year old or three to five year old children.

Regression of the paranoid schizophrenic to about the nine to

TABLE V

MEDIAN VALUES AND PERCENT OF GROUPS RESPONDING ON ALL VARIABLES
USED IN THE INVESTIGATION OF REGRESSION AND DEVELOPMENT

SCORING VARIABLES	3-5*	9-10	Ad	N-A	S	Pa
Human in I	0** (20)	0 (40)	1.25 (64)	1.10 (66)	.82 (56)	0 (40)
Nature in I	0 (04)	0 (16)	.56 (52)	1.13 (62)	0 (28)	.56 (52)
Total Nature	0 (40)	0 (48)	.93 (76)	1.22 (76)	0 (32)	.69 (56)
Change of Concept	0 (44)	3.00 (84)	.84 (64)	1.18 (64)	1.83 (68)	5.75 (88)
Total Inanimate	1.00 (68)	1.94 (88)	1.00 (72)	1.38 (78)	3.00 (84)	3.80 (92)
Animal in IV	0 (20)	.55 (52)	0 (28)	0 (30)	0 (32)	.71 (60)
Movement Level IV	0 (48)	1.67 (80)	.95 (68)	.98 (64)	1.81 (72)	2.14 (88)
Physiological in I	0 (..)	0 (36)	.69 (60)	0 (32)	0 (48)	1.60 (72)
Total Physiological	0 (32)	0 (40)	.69 (60)	0 (34)	.60 (52)	2.00 (80)

* The groups are designated as follows: Ad for adolescents, N-A for normal control adults, S for undifferentiated schizophrenics, Pa for paranoid schizophrenics. Child groups are designated by chronological age.

** Upper figures indicate the median, and lower (parenthetical) figures denote the percent of cases within the group giving at least one response on that scoring variable.

TABLE VI

CHI SQUARE AND PROBABILITY VALUES FOR OVERALL
COMPARISONS OF ALL ADULT GROUPS: BASED ON TABLE V

SCORING VARIABLES	Chi Square	PROBABILITY*
Human in I	12.75	.01
Total Nature	18.75	.0001
Nature in I	18.00	.001
Change of Concept	14.25	.001
Total Inanimate	6.75	.05
Animal in IV	6.00	.05
Movement Level IV	9.75	.01
Physiological in I	18.75	.0001
Total Physiological	9.75	.01

*The value in this column represents the probability that one or more of the adult groups differed significantly from one another.

TABLE VII

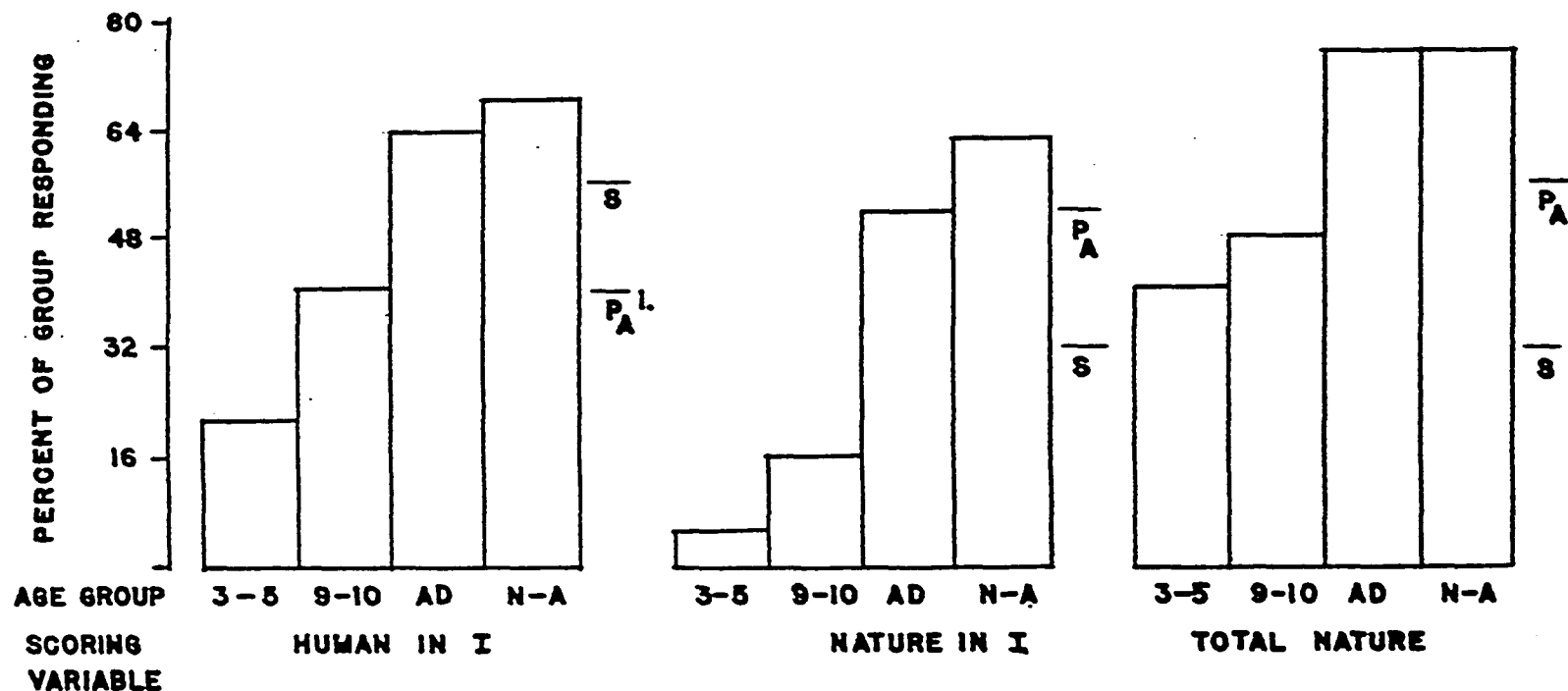
PROBABILITY VALUES FOR THE COMPARISON OF GROUPS TAKEN TWO AT A
TIME: VARIABLES USED IN THE STUDY OF REGRESSION AND DEVELOPMENT

COMPARISONS**	Scoring Variables*								
	HI	TN	NI	CC	TI	A4	ML4	PI	TP
3-5 vs 9-10	***			.008b	.02b	.02b	.02b	.003b	
3-5 vs Ad	.002b	.01b	.001b					.001b	.04b
3-5 vs N-A	.001b	.001b	.001b						
3-5 vs S	.02b		.05b	.09b	.005b		.08b	.001b	
3-5 vs Pa			.001b	.001b	.001b	.004b	.002b	.001b	.002b
9-10 vs Ad	.09b	.04b	.007b		.01a	.08a		.09b	
9-10 vs N-A	.03b	.02b	.001b			.07a			
9-10 vs S					.09b				
9-10 vs Pa			.007b		.005b			.01b	.01b
Ad vs N-A								.02a	.03a
Ad vs S		.002a	.08a		.002b				
Ad vs Pa	.09a			.05b	.001b	.04b	.09b		
N-A vs S		.005a	.01a		.01b				
N-A vs Pa	.09a	.08a		.04b	.01b	.04b	.09b	.005b	.001b
S vs Pa		.09b	.08b			.02b		.08b	.04b

*Scoring variables are listed in the same order as in Table VI. For easier reading, the variables are abbreviated. Thus, "HI" designates "Human in I," "TN" signifies "Total Nature," and so forth.

**Groups are designated as in Table V.

***When the first group listed predominates, the P value is followed by "a." When the second group listed predominates, the P value is followed by "b."



1. THE GROUPS ARE DESIGNATED AS FOLLOWS— "S" FOR UNDIFFERENTIATED SCHIZOPHRENICS, "P_A" FOR PARANOID SCHIZOPHRENICS, "N-A" FOR NORMAL CONTROL ADULTS, AND "AD" FOR ADOLESCENTS. CHILD GROUPS ARE DESIGNATED BY CHRONOLOGICAL AGE.

FIGURE 1
DEVELOPMENT AND REGRESSION— SCORING VARIABLES SHOWING
AN INCREASE IN USE WITH AGE

ten year old level is felt to be demonstrated.

Nature percepts within Movement Level I. As indicated in Figure 1B, and Table VII, the paranoid schizophrenic patients did not differ from the normal adults. The undifferentiated schizophrenics gave fewer nature responses possessing an internal source of energy than did the normal adults (.01 level of confidence), but did not differ significantly from the nine to ten year old children.

Regression of the undifferentiated schizophrenic to approximately the nine to ten year old level is felt to be demonstrated.

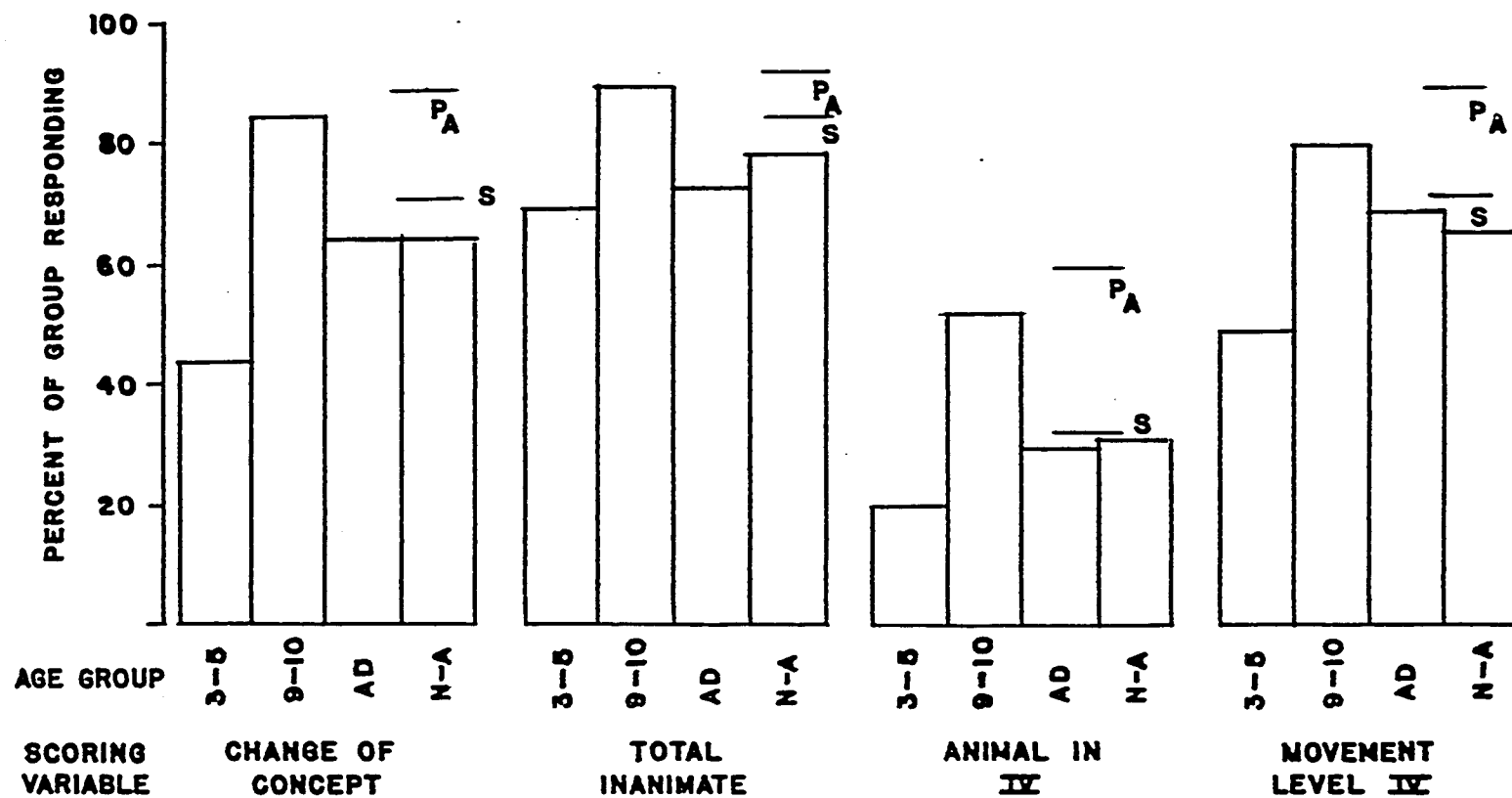
Nature percepts within any movement level. The normal adult control group produced significantly more nature percepts than the undifferentiated schizophrenics (.005 level of confidence), but not more than did the paranoid schizophrenics. When compared with the child groups, the undifferentiated schizophrenics did not differ from either the nine to ten year old or three to five year old children.

Regression of the undifferentiated schizophrenic to about the nine to ten year old level is felt to be demonstrated.

Regression on Scoring Variables which Demonstrated Greatest Use During the Latency Period

The data for those scoring variables whose use was greatest during the latency period are presented in Figure 2, and Table VII.

Change of Concept. As indicated in Figure 2A, and Table VII, the undifferentiated schizophrenics did not differ from the normal



I.- SEE FIGURE 1.

FIGURE 2
DEVELOPMENT AND REGRESSION — SCORING VARIABLES SHOWING
GREATEST USE IN THE LATENCY PERIOD

adults in the frequency with which the stimulus was reported as changing its form sufficiently to look like something else during the same sequence. The paranoid schizophrenics, however, used this scoring category more frequently than did the normal control group (.04 level of confidence). The paranoids could not statistically be distinguished from the nine to ten year old children.

Regression of the paranoid schizophrenic to approximately the nine to ten year old level is felt to be demonstrated.

Inanimate percepts within any movement level. Both pathological groups differed (.01 level of confidence) from the normal adults in producing more "object" responses than the latter group. However, as seen in Figure 2B and Table VII, the pathological groups also reported significantly more inanimate percepts than any of the child groups.

Regression of either of the pathological groups is felt not to be demonstrated.

Animal percepts within Movement Level IV. As summarized in Figure 2C and Table VII, the paranoids reported more animals seen as disintegrating than did the adult controls (.04 level of confidence). The undifferentiated schizophrenics did not differ from the normal adults. No significant difference was observed to occur between the paranoids and the nine to ten year olds.

Regression of the paranoid schizophrenic to about the nine to ten year old level is felt to be demonstrated.

Use of Movement Level IV. The undifferentiated schizophrenic patients did not differ significantly from the normal adult controls. However, as seen in Figure 2D and Table VII, the paranoids made more use of disintegrative concepts than did the adult controls (.09 level of confidence). The paranoids could not statistically be distinguished from the nine to ten year old children.

Regression of the paranoid schizophrenic to approximately the nine to ten year old level is felt to be demonstrated.

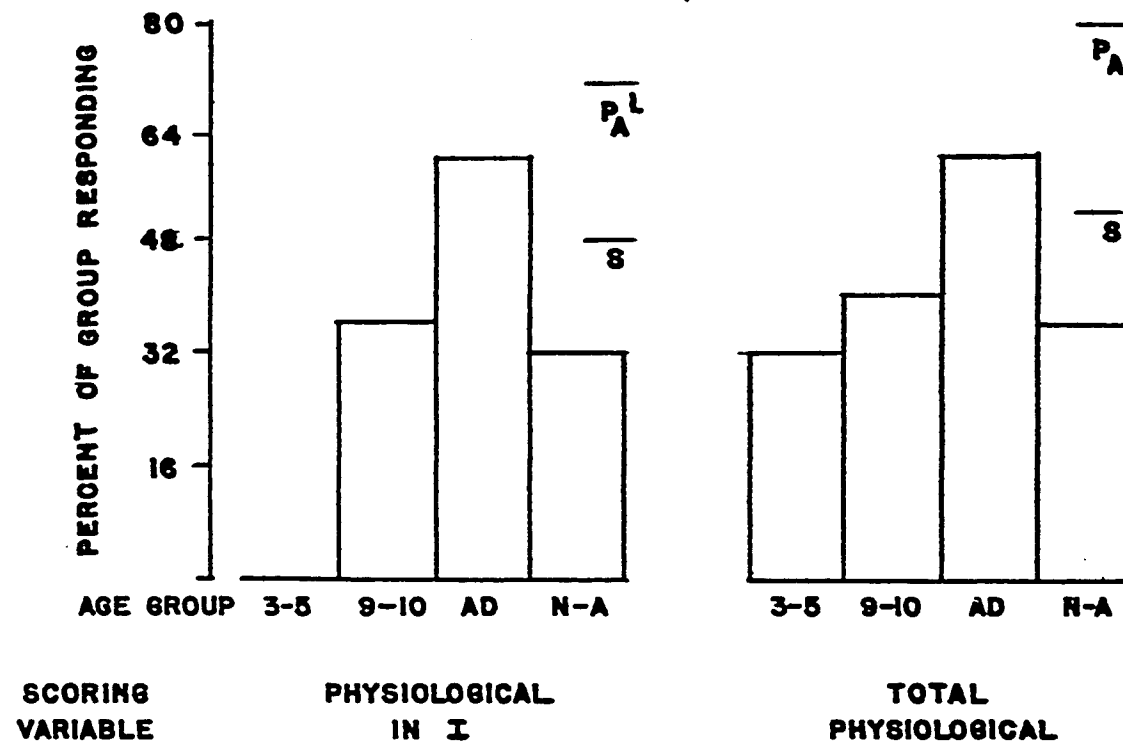
Regression on Scoring Variables which Demonstrated Greatest Use During the Adolescent Period

The data for those scoring variables whose use was greatest during the adolescent period are presented in Figure 3, and Table VII.

Physiological percepts within Movement Level I. As summarized in Figure 3A and Table VII, the paranoid schizophrenic was the only pathological group to significantly differ from the normal adult controls (.005 level of confidence). Significantly more paranoids reported physiological concepts within an internal energy source than did controls. The paranoids did not differ significantly from the adolescents.

Regression of the paranoid schizophrenic to about the fifteen to sixteen year old level is felt to be demonstrated.

Physiological percepts within any movement level. Once again, the paranoid schizophrenics produced more total physiological concepts



I. SEE FIGURE 1.

FIGURE 3

DEVELOPMENT AND REGRESSION— SCORING VARIABLES SHOWING
GREATEST USE IN ADOLESCENCE

than did the normal adults (.001 level of confidence). And, once again, they could not be distinguished from the adolescents.

Regression of the paranoid schizophrenic to about the fifteen to sixteen year old level is felt to be demonstrated.

Summary

Of the seven scoring variables on which the paranoid schizophrenic group differed from the normal adult control group and, hence, was expected to demonstrate regression, the paranoid group could not statistically be distinguished from the nine to ten year old group on four occasions, the adolescent group on two occasions, and responded contrary to expectation once. Of the three scoring variables on which the undifferentiated schizophrenics were expected to show regression, they could not be distinguished from the nine to ten year old child group in two instances, and behaved contrary to expectation once.

Development

Table VIII lists the medians and percent of each group responding for each of the remaining scoring variables not included in the study of regression (Table V), but which demonstrated significant differences within the presumably normal populations. The Chi square and probability values for Table VIII are found in Table IX. Following the overall Chi square tests, groups were taken two at a time and subjected to further Chi square analysis in order to determine those groups which differed significantly from one another.

TABLE VIII

MEDIAN VALUES AND PERCENT OF GROUPS RESPONDING ON ALL VARIABLES
USED IN THE STUDY OF DEVELOPMENT NOT REPORTED IN TABLE V

SCORING VARIABLES	3-5*	9-10	Ad	N-A	S	Pa
Inanimate in II	0** (16)	.86 (60)	.69 (60)	.37 (52)	2.00 (72)	2.13 (84)
Total Human	0 (40)	.95 (68)	1.57 (68)	1.73 (70)	1.91 (68)	0 (48)
Total Chemico- physical	0 (04)	0 (28)	0 (36)	0 (44)	0 (28)	0 (40)
Movement Level I	2.57 (64)	6.00 (100)	7.57 (100)	7.22 (100)	7.00 (92)	7.25 (100)
Movement Level II	0 (44)	2.00 (80)	2.25 (92)	2.67 (92)	3.75 (88)	3.63 (88)
Flexor Movement	0 (48)	3.00 (96)	2.38 (96)	2.87 (98)	4.83 (100)	4.00 (96)
No. Content Categories	3.81***	4.89	5.44	5.26	4.80	5.20
No. Scorable Responses	9.40***	14.13	11.63	13.29	13.75	14.33
Movement Level III	4.33 (92)	2.75 (84)	0 (44)	1.21 (66)	1.06 (68)	1.25 (68)

*The groups are designated as follows: Ad for adolescents, N-A for normal control adults, S for undifferentiated schizophrenics, Pa for paranoid schizophrenics. Child groups are designated by chronological age.

**Upper figures indicate the median and lower (parenthetical) figures denote the percent of the group which gave at least one response on that scoring variable.

***Percent of groups responding on these variables was 100.

TABLE IX

CHI SQUARE AND PROBABILITY VALUES FOR OVERALL COMPARISONS
OF ALL NORMAL GROUPS: BASED ON TABLES V AND VIII

SCORING VARIABLES	Chi Square	Probability*
Human in I	16.25	.001
Nature in I	28.75	.0001
Total Nature	16.25	.001
Change of Concept	8.75	.05
Animal in IV	8.75	.05
Physiological in I	22.50	.0001
Inanimate in II	13.75	.001
Total Human	10.00	.01
Total Chemico-physical	16.75	.001
Movement Level I	17.50	.001
Movement Level II	12.50	.01
Flexor Movement	41.25	.0001
No. Content Categories	12.50	.01
No. Scorable Responses	10.00	.01
Movement Level III	17.50	.001

*The value in this column represents the probability that one or more of the normal groups differed significantly from the others.

TABLE X

PROBABILITY VALUES FOR THE COMPARISON OF GROUPS TAKEN
TWO AT A TIME: VARIABLES USED IN THE STUDY OF DEVELOPMENT

COMPARISONS**	Scoring Variables*								
	I2	TH	CP	ML1	ML2	FM	CC	SR	ML3
3-5 vs 9-10	.001b	***.04b	.05b	.001b	.02b	.001b	.01b	.002b	
3-5 vs Ad	.001b	.04b	.005b	.001b	.001b	.001b	.001b	.09b	.001a
3-5 vs N-A	.003b	.01b	.001b	.001b	.001b	.001b	.01b	.002b	.02a
9-10 vs Ad								.04a	.008a
9-10 vs N-A			.08b						
Ad vs N-A								.07b	.07b

*Scoring variables are listed in the same order as in Table VIII. For easier reading, the variables are abbreviated. Thus, "I2" designates "Inanimate in II," "CP" signifies "Total Chemico-physical," "CC" denotes "Number of Content Categories," and so forth.

**Groups are designated as in Table VIII.

***When the first group listed predominates, the P value is followed by "a." When the second group listed predominates, the P value is followed by "b."

Developmental trends are summarized in Tables VII¹ and X, as well as Figures 1, 2A, 2C, 3A,² and 4 through 6. Tables V and VIII provide the basic statistics for all the figures and probability tables which follow them.

Scoring Variables which Demonstrated an Increase in Use with Age

The data for those scoring variables whose use increased with age are presented in Figures 1 and 4, and Table X. The rate of development on these scoring categories, however, was not uniform and can be characterized as follows:

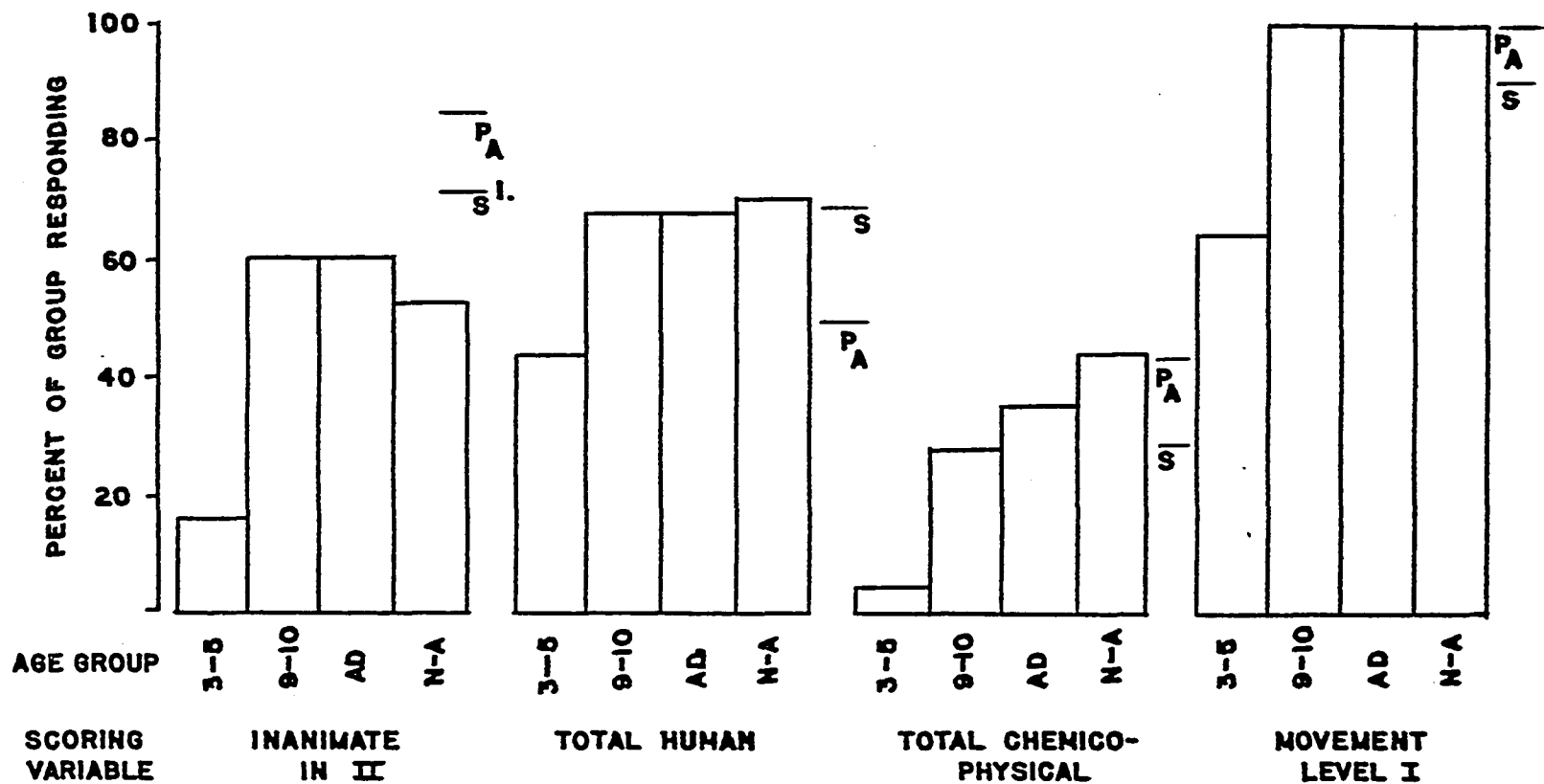
Early development. Six scoring variables demonstrated differences significant to at least the .10 level of confidence between the three to five year old child group and all other normal groups. In these six instances, the nine to ten year olds, adolescents, and normal adults did not differ from one another. Table IX presents the probability values for these scoring variables.

Development appears to be complete between the ages of five and nine years on:

- a. Inanimate objects reported as being moved by some external force (Figure 4A).
- b. Total number of human percepts produced (Figure 4B).
- c. Use made of Movement Level I or internal source of

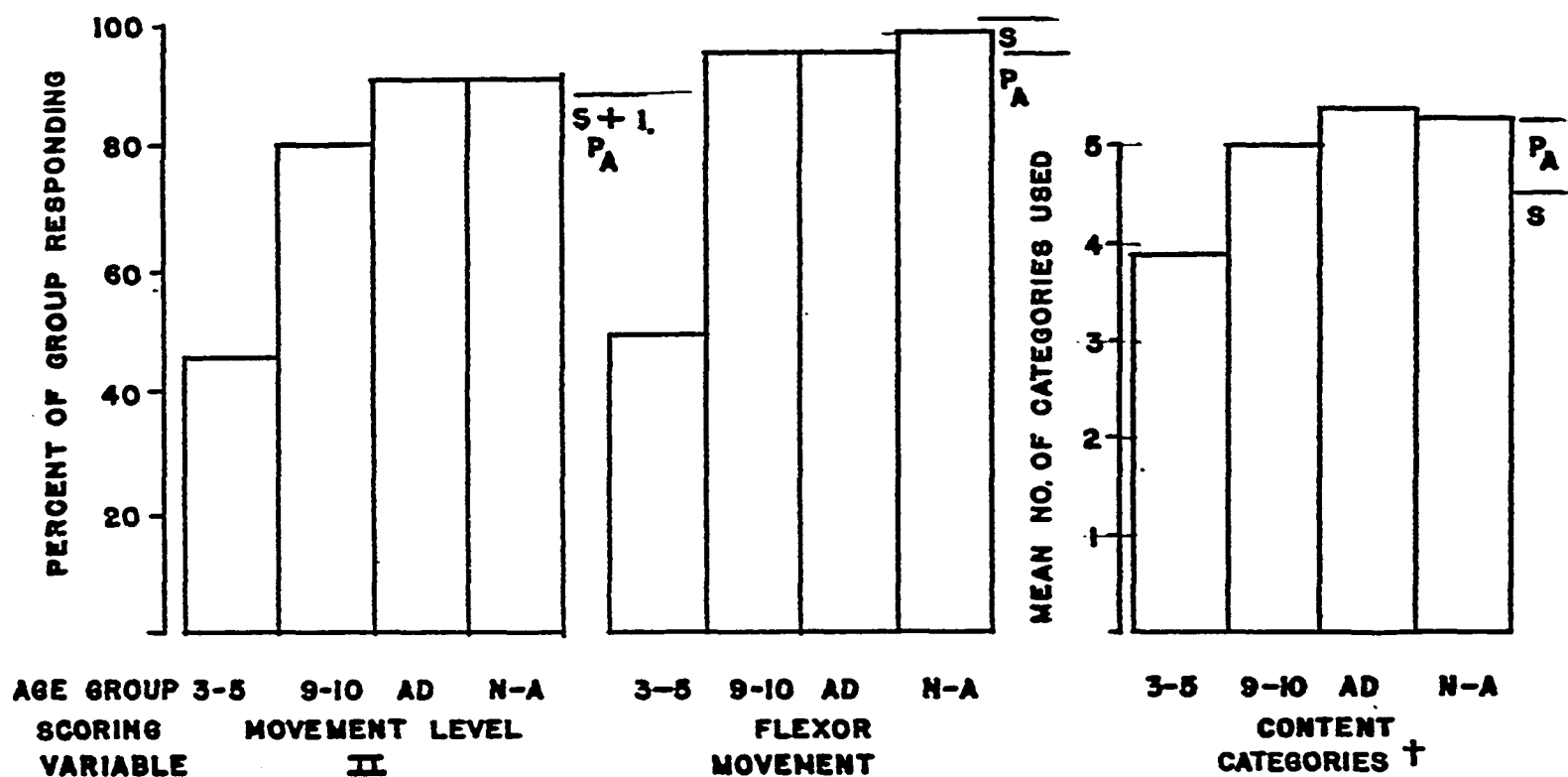
¹ Supra, p. 30.

² Supra, pp. 32, 35, 38.



I. SEE FIGURE 1

FIGURE 4
DEVELOPMENT — SCORING VARIABLES SHOWING AN INCREASE
IN USE WITH AGE



1. SEE FIGURE 1

† FIGURE IS REPORTED IN TERMS OF MEAN SCORES SINCE THE PERCENT RESPONDING IS OBVIOUSLY 100.

FIGURE 4 (CONT.)

DEVELOPMENT— SCORING VARIABLES SHOWING AN INCREASE IN USE WITH AGE

energy (Figure 4D).

d. Use made of Movement Level II or external source of energy (Figure 4E).

e. Amount of Flexor Movement reported (Figure 4F).

f. Number of content categories utilized (Figure 4G).

Medium development. Three scoring variables demonstrated significant differences between the two youngest groups and the two oldest groups; that is, the three to five year olds did not differ from the nine to ten year olds and the adolescents did not differ from the normal adults, but each of the older groups differed from each of the younger groups. Table VII presents the probability values for these scoring variables.

Development appears to be complete between the ages of ten and fifteen years on:

a. Human percepts reported as moving as a result of their own volition (Figure 1A).

b. Nature concepts mentioned moving under an internal source of energy (Figure 1B).

c. Total number of nature percepts produced (Figure 1C).

Gradual development. One scoring variable demonstrated differences between all groups except the nine to ten year olds compared with the adolescents and the adolescents compared with the normal adults. Table X presents the probability values for this variable.

Development appears to be complete at a level approximating the

fifteen to sixteen year old age level on the following:

- a. Total number of chemico-physical percepts reported (Figure 4C).

Scoring Variables which Demonstrated Greatest Use During the Latency Period

The data for those scoring variables whose use increased during the latency period are presented in Figures 2 and 5, and in Tables VII and X.

- a. The frequency with which a concept changes within a sequence was greater than would be expected by chance (.008 level of confidence) between the three to five year olds and the nine to ten year olds. None of the other groups differed significantly from one another (Table VII and Figure 2A). This might be considered an artifact or one of the unlikely significant differences to be expected by chance if it were not for the size of the probability value and the fact that such a result conforms well to the regression hypothesis.

- b. Animals disintegrating was reported more frequently by the nine to ten year olds (at least .08 level of confidence) than by any other group. None of the other groups differed significantly from one another (Table VII and Figure 2C).

- c. The number of scorable responses produced might more properly be reported as a failure of the adolescents to give their than an emphasis during latency, especially since the nine to ten year olds did not significantly differ from the normal adults. It is a fact,

however, that the nine to ten year old children produced significantly more scorable responses than did either the three to five year old children or adolescents (Table X and Figure 5).

Scoring Variable which Demonstrated Greatest Use During Adolescence

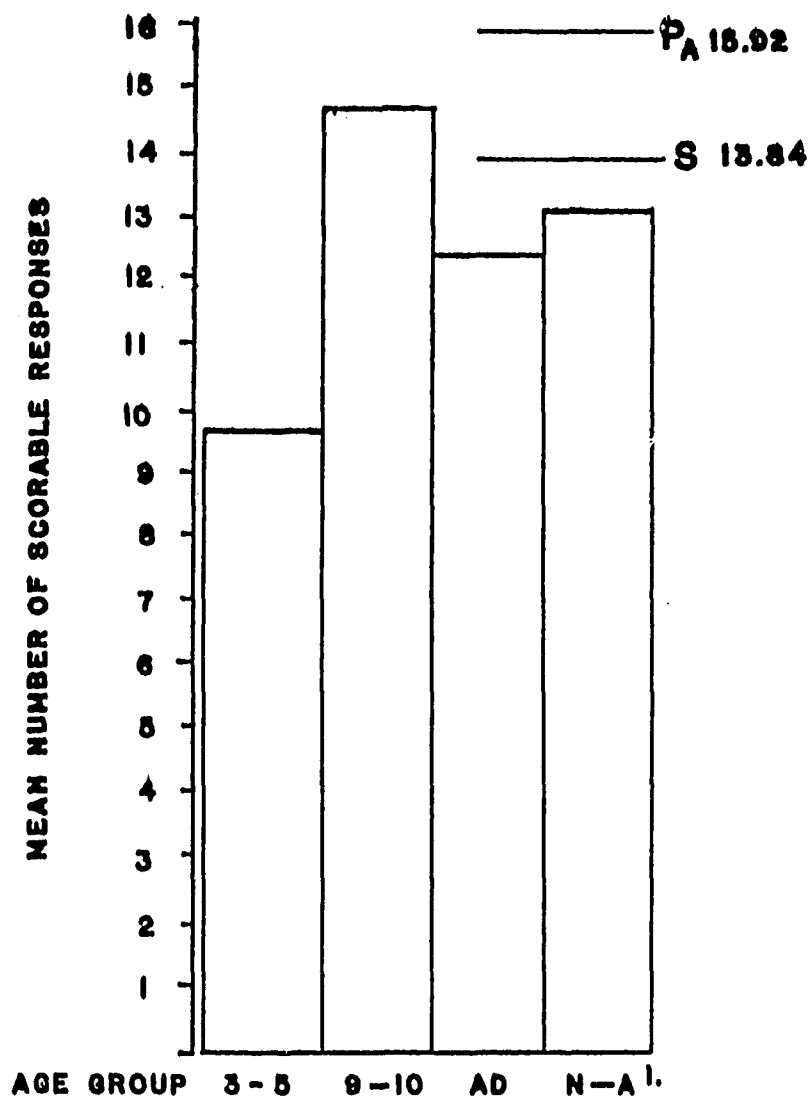
Of all variables studied, only the use of physiological concepts reported as moving on the basis of an internal source of energy demonstrated greatest use during adolescence (Table VII and Figure 3A). Every group, with the exception of the nine to ten year olds compared with the adults, differed significantly from every other group on this variable.

Scoring Variable which Demonstrated Greatest Use During Early Childhood

Three to five year old children reported significantly more percepts without attributing motion to them than did any other group with the exception of the nine to ten year old children (Table X and Figure 6). The adolescents also differed from all other groups in producing fewer concepts in Movement Level III.

Summary

Of the fifteen scoring variables on which overall tests of Chi square indicated significant differences existing between the normal groups, ten demonstrated an increase in use with age, three showed greatest use during the nine to ten year old age period, and one each revealed most use during the three to five and adolescent age periods.



SCORING VARIABLE —

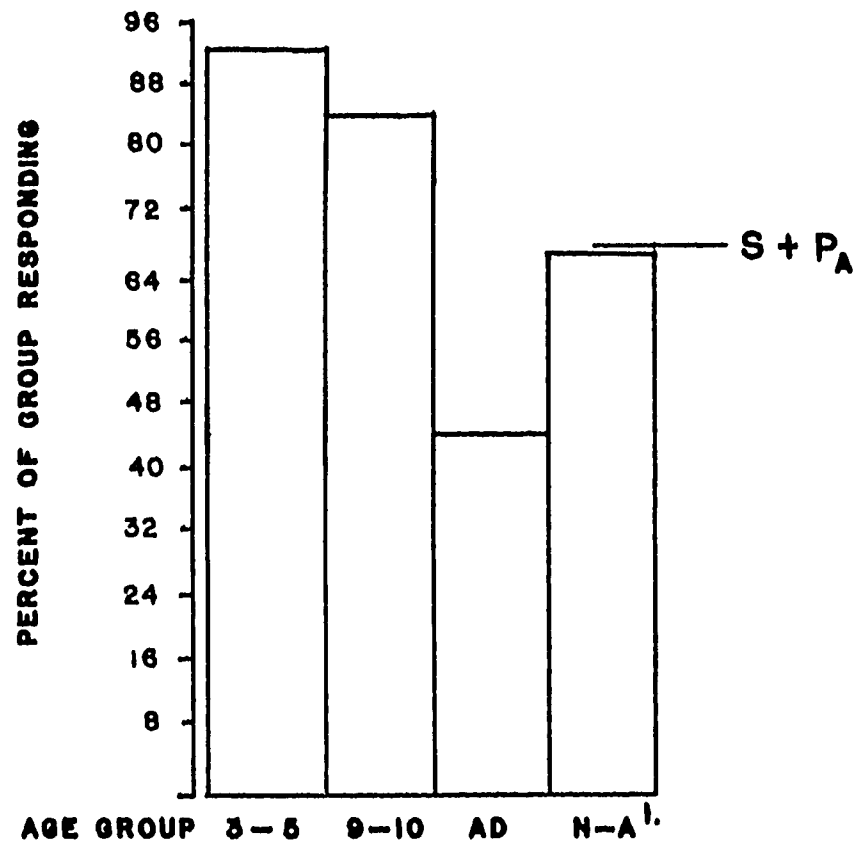
NUMBER OF SCORABLE RESPONSES †

1. SEE FIGURE 1

† SEE FIGURE 4

FIGURE 5

DEVELOPMENT — SCORING VARIABLE SHOWING
GREATEST USE IN THE LATENCY PERIOD



SCORING VARIABLE —
MOVEMENT LEVEL III

I. SEE FIGURE 1

FIGURE 6

DEVELOPMENT — SCORING VARIABLE SHOWING
GREATEST USE IN THE THREE TO FIVE
YEAR OLD AGE PERIOD

Sex Differences in Response to the Scoring Variables

Sex differences were tested for three groups of normal subjects. The groups were composed as follows; child (three to five and nine to ten years of age), adolescent, and adult. Of the 18 variables used in this study, two revealed sex differences and are summarized in Table XI. Significantly more girls than boys in the child group used nature concepts (.05 level of confidence), and significantly more adolescent girls than boys reported animals as disintegrating (.10 level of confidence).

Popular Content for Each Sequence

Table XII summarizes the kind of content reported by each normal experimental group within each sequence. Content with a response frequency of less than 16 percent is not reported unless (a) it bore a close resemblance to a kind of content produced more frequently, (b) logically seems unusual but was reported by at least 12 percent of the subjects, or (c) there was no other content which had a higher percent of response.

TABLE XI

CHI SQUARE AND PROBABILITY VALUES FOR VARIABLES
ON WHICH SIGNIFICANT SEX DIFFERENCES OCCURRED

SCORING VARIABLES	Chi Square	Probability
Animal in IV (Ad)*	2.73	.10 (F)**
Total Nature (Child)	3.84	.05 (F)

*Parenthetical symbols designate the age group in which the difference occurred.

**Parenthetical letters indicate the sex which produced the greater frequency of responses on the scoring variable. The female groups are designated by "F." Thus, more female adolescents reported animals disintegrating than did male adolescents.

TABLE XII

FREQUENT RESPONSES BY SEQUENCE FOR ALL NORMAL GROUPS

Sequence	Response	Group*	Percent Giving	Comment
1	bug	3-5	..	...
		9-10	52	Reported in many kinds of activities, especially fighting. Also reported as playing, looking for food, or simply moving.
		Ad	28	Usually reported as fighting for food.
		N-A	44	Same as for adolescents.
	tree	3-5	20	Sometimes reported as moving. When moving, the cause is usually the wind.
		9-10	..	...
		Ad	..	...
		N-A	..	...
	bird	3-5	..	...
		9-10	..	...
		Ad	20	Frequently reported as fighting, either with bugs or dogs.
		N-A	16	Same as for adolescent.
	bear or dog	3-5	16	Only occasionally reported as moving.
		9-10	..	...

*The groups are designated as follows: Ad for adolescents, and N-A for normal southern adults. Child groups are designated by chronological age.

TABLE XII (continued)

FREQUENT RESPONSES BY SEQUENCE FOR ALL NORMAL GROUPS

Sequence	Response	Group*	Percent Giving	Comment
1	bear or dog	Ad	12	Most frequently reported in action with bug or bird. No bears were produced.
		N-A	16	Same as for adolescent.
	turtle	3-5	12	Seldom reported as moving.
		9-10	..	...
		Ad	..	...
		N-A	..	...
2	elongated animals	3-5	44	Seldom reported as moving. Snake produced by 36%, caterpillar by 8%.
		9-10	36	Usually mentioned as shedding hair or skin. Snake reported by 16%, caterpillar by 20%.
		Ad	24	Seen in various activities. More variety in specific content than by above groups.
		N-A	..	...
	fire	3-5	..	...
		9-10	..	...
		Ad	..	...

*The groups are designated as follows: Ad for adolescents, and N-A for normal southern adults. Child groups are designated by chronological age.

TABLE XII (continued)

FREQUENT RESPONSES BY SEQUENCE FOR ALL NORMAL GROUPS

Sequence	Response	Group*	Percent Giving	Comment
2	fire	N-A	16	Various sorts such as fuse, gun-powder igniting, fire-break.
	mole	3-5	..	...
		9-10	12	Seen as burrowing.
		Ad	..	...
		N-A	..	...
3	tree	3-5	40	Frequently reported as blown by the wind or breaking because rotten.
		9-10	24	Often moved by the wind.
		Ad	20	Being blown by the wind or falling apart.
		N-A	28	Usually being blown by the wind.
	human	3-5	..	...
		9-10	..	...
		Ad	16	Seen in varied activities.
		N-A	20	Includes African natives and Indians.
	porcupine	3-5	..	...
		9-10	12	Bristling or losing quills.

*The groups are designated as follows: Ad for adolescents, and N-A for normal southern adults. Child groups are designated by chronological age.

TABLE XII (continued)

FREQUENT RESPONSES BY SEQUENCE FOR ALL NORMAL GROUPS

Sequence	Response	Group*	Percent Giving	Comment
3	porcupine	Ad	...	...
		N-A	...	...
4	eggs	3-5	28	Sometimes mentioned with the animal which laid them.
		9-10	...	...
		Ad	24	Usually mentioned with the animal which laid them.
		N-A	16	Same as for adolescent.
	disintegration	3-5	...	...
		9-10	64	All sorts of objects or animals losing pieces or throwing things.
		Ad	16	Wind blowing objects about.
		N-A	...	...
5	marine scene	3-5	...	...
		9-10	16	Seaweeds being moved by currents.
		Ad	...	...
		N-A	28	Same as for 9-10.
6	human	3-5	16	All Indians.

*The groups are designated as follows: Ad for adolescents, and N-A for normal southern adults. Child groups are designated by chronological age.

TABLE XII (continued)

FREQUENT RESPONSES BY SEQUENCE FOR ALL NORMAL GROUPS

Sequence	Response	Group*	Percent Giving	Comment
6	human	9-10	32	Seen as fighting or dancing. Eskimo accounts for 16%, and Indian for 16%.
		Ad	48	About half the activity is reported as fighting, and about half as dancing and kissing. Eskimo and Indian account for 12%.
		N-A	48	Approximately 20% mention fighting, and 28% dancing or embracing.
	animal	3-5	..	...
		9-10	..	...
		Ad	16	Mostly reported as fighting.
		N-A	..	...
	dragon	3-5	..	...
		9-10	12	No common movement mentioned.
		Ad	..	...
		N-A	..	...
7	disintegration	3-5	42	Mostly humans, snakes, or trees.
		9-10	20	Particularly trees.
		Ad	32	Particularly plants.
		N-A	40	Great variety of content mentioned.

*The groups are designated as follows: Ad for adolescents, and N-A for normal southern adults. Child groups are designated by chronological age.

TABLE XII (continued)

FREQUENT RESPONSES BY SEQUENCE FOR ALL NORMAL GROUPS

Sequence	Response	Group*	Percent Giving	Comment
7	river	3-5	..	...
		9-10	..	...
		Ad	16	Mentioned as flowing or changing its course.
		N-A	..	...
8	fire	3-5	..	...
		9-10	28	Explosions account for 12%.
		Ad	24	Explosions account for 12%.
		N-A	28	Explosions account for all 28%.
	storms	3-5	..	...
		9-10	16	Snowstorms and duststorms.
		Ad	..	...
		N-A	24	Great variety of kinds.

*The groups are designated as follows: Ad for adolescents, and N-A for normal southern adults. Child groups are designated by chronological age.

CHAPTER IV

DISCUSSION

The concept of schizophrenia as representing a regression to any very early level of development was not fully supported by the results of this investigation. They suggest, instead, that insofar as perceptual development can be thought of as paralleling libidinal development, to the degree that the PMS is capable of eliciting various phases of development, and to the extent that the groups utilized may be felt to be appropriate for a test of the theory, the regression hypothesis must be considerably modified. The three to five year old children, for example, performed hardly at all like either of the schizophrenic samples. Rather, they were almost completely deviant in their responses from any of the other groups. The nine to ten year old children, however, rarely could statistically be differentiated from either schizophrenic group with regard to the formalized scoring categories. On two scoring variables, the paranoid schizophrenic group could not be distinguished from the adolescent group. To this extent, then, does the present investigation find support for regressive phenomena in schizophrenia. On the other hand, it provides negative evidence for the supposition that the schizophrenic individual regresses to an infantile level of development.

Mentioned above are three assumptions which must be met before any study might validly claim to test this concept. First, can perceptual tests be utilized to investigate what, psychoanalytically, is

a libidinal matter? Fenichel (14), and others (16, 31, 41) make no explicit mention of the relationship between the libido and perception. However, they do speak of the development of perception and its role in the formation of the ego. The ego, generally, is considered that "agent" which mediates between instinctual (partly libidinal) strivings and external reality on the basis of the experiences (perception?) it has previously undergone. So that experimentation might proceed where such a psychoanalytic concept is employed, it appears logical to make the assumption that a perceptual task can test a libidinal concept.

Second, does the PMS adequately tap differences between groups; especially, between groups for whom there is prior evidence that they are samples of psychologically different populations? In large measure, the present study furnishes an answer. As would be expected on the basis of everyday observation, the groups of children and normal adults differed widely from one another on the majority of scoring categories. Further, the majority of scoring variables used demonstrated an approximation of a normal growth curve. Even the exceptions to the normal growth curve generally were explainable, if only on a post hoc basis; i.e., since the deviations were in the same direction as the pathological norms, they can be "explained" by the psychoanalytic hypothesis of a mild and temporary regression about the time of adolescence (14).

Third, are the groups appropriate for testing the hypothesis? It is true that a number of groups composed of age ranges other than used in this investigation might have been tested. However, the groups were specifically selected so as to represent the extremes from whom

valid responses might be obtained. For this reason, were the regression hypothesis absolutely correct as formulated by the orthodox psychoanalysts, these groups should have enabled one to confirm, by rough interpolation, the specified depth of regression in schizophrenic disorders to as low as the three year age level. In actuality, a portion of this objective was accomplished, although not in accord with orthodox theory -- rather than regress to an infantile level of development, both schizophrenic groups more closely resembled the preadolescent. Little can be said concerning the relative regression of the paranoid and undifferentiated schizophrenic groups.

The choice of experimental populations presents another problem which merits some discussion. That is, is it legitimate to compare a northern with a southern population -- especially a southern child group with a northern adult group as was done in the study of regression? While the orthodox psychoanalytic position gives greatest weight to the universality of symbols and psychological processes, the more culturally oriented psychoanalysts, and certainly psychologists would concern themselves with this question. It was for this reason that a southern adult control sample was compared with its northern counterpart. Since these two groups did not differ from one another, it was assumed no differences would exist between northern and southern children. This is not to suggest that the problem can therefore be ignored. It suggests, instead, that future studies might be conducted along this dimension to modify and supplement the findings of this investigation.

The results obtained tend to support, especially, the studies of Cameron (9). Although working in a different area -- levels of thinking -- he found little evidence that individuals with schizophrenic disorders resembled young children in their approach to problems. The present study, nevertheless, does not entirely substantiate Cameron's conclusion that regression does not occur. As previously mentioned (20), it has been suggested that his was a too rigid and limiting definition of regression, and his studies are open for re-interpretation.

If "loose" conclusions are formulated from the results of this study, they tend also to support experiments with the Rorschach on this variable (47). If, however, the present results are interpreted in a stricter fashion, it is evident that there is some disagreement as to the depth of regression revealed by the two studies. That is, regression appeared to be to a lower level when the Rorschach test was used than when the PMS was used to examine the regression hypothesis.¹

The above discussion almost naturally suggests future areas of research. Do the results differ because there is an important and

¹In reviewing the preliminary study conducted by this writer, Dr. Robert A. Mathews, Chairman of the Department of Psychiatry, Louisiana State University School of Medicine, made an observation which might have relevance at this point. He suggested that undifferentiated schizophrenics are still in the process of crystallizing their defenses and, hence, might not be expected to demonstrate much regression; that it is only when they have adopted one of the distinct schizophrenic reactions that the regression hypothesis might definitely be expected to apply. The studies utilizing the Rorschach used such groups -- hebephrenic and catatonic -- whereas the present study did not. Hence, it may be on this variable of crystallization of defenses that the actual disagreements between the studies occurred.

unknown difference between ambiguous stimuli presented in static (Rorschach) form as contrasted with dynamic (PMS) form? What is the relationship between movement scores on the Rorschach and movement level scores on the PMS? Is there a correlation, for example, between form level on the Rorschach and the use of disintegrative movement on the PMS? In order to increase the sensitivity of either (or both) instruments in clinical and research situations, answers to these and similar questions might well be sought in later investigations.

Sex differences observed in this investigation are somewhat hazardous to interpret because of the limited number of scoring variables concerned. Significantly more young girls than boys reported nature concepts (.05 level of confidence), and more adolescent girls than boys mentioned animals disintegrating (.10 level of confidence). Neither of these differences continued into adulthood. Especially because of the size of the probability values, probably the most reasonable interpretation to give the differences is that they were chance occurrences.

Developmental trends, as revealed by this investigation, indicate that perceptual development is fairly near completion by the age of nine or ten. The majority of scoring variables manifested an increase in use with age. This is consistent with the general conception of development as represented by growth curves based on variables as diverse as from height to the use of movement on the Rorschach (1). The results suggest, also, that the major difference between older

children and adults in the perception of movement in ambiguous figures lies, not in the structural aspects of their perception, but in the use made of concepts demanding diversified experience; i.e., where a young child might verbalize that "somebody" was doing "something," the adult would be more likely to designate the kind of person and the character of the activity. A second difference was found, qualitatively, in the type of activity reported. In those sequences in which humans or animals were frequently mentioned as interacting, the children tended to designate the motion as fighting whereas the adults manifested a preference for calling it a cooperative enterprise.

It was also seen from the results of this study that some scoring variables showed a curvilinear development with age. Although, as mentioned above, this can well be explained by psychoanalytic theory, such a result also suggests areas for further research. Was this an artifact of this investigation, and would the use of several additional age levels of both children and adults result in the same kind of relationship? If the same relationships continue to hold between the scoring variable and age, what does this indicate about the psychological meaning of the variable or about the "deviant" age level?

A few words might be mentioned with reference to the notion of concept or construct validity (49). The question might be asked concerning this study, "what is being validated -- the test or the underlying hypothesis?" (p. 15). And as the same source answers its own question, obviously both are being evaluated simultaneously. In this case, the test seems to have fared well; differences were observed

to obtain between all groups, and the differences are fairly well rationalized in terms of present psychological concepts. However, the regression hypothesis was found in need of modification, at least as concerns the PMS. Thus, while both the test and the theory were being validated, it appears possible, in some measure, to weight the amount of validity contributed by each.

CHAPTER V

SUMMARY AND CONCLUSIONS

The hypothesis that schizophrenia is a disorder in which the individual regresses to an earlier level of development was examined by comparing the responses given by normal children, normal adults, and schizophrenic adults to the Projective Movement Sequences test. All groups were equated with respect to socioeconomic status. In addition, the adult groups were matched with reference to age, the southern groups as concerned intelligence, and the adult controls and children on the basis of an absence of noticeable behavior pathology.

Specifically, it was expected that, on those scoring variables which evidenced significant differences between the adult control and pathological groups, the responses of some of the child groups would not differ significantly from those of the pathological groups and that the depth of regression, if it occurred, could thus be approximated. That is, if the regression hypothesis as applied to schizophrenia is correct, the responses of the pathological group should represent a lower level of development on those variables than indicated by the chronological age of the group. The expected result was obtained in eight of ten instances. The similarities to, and differences from the results of related studies were indicated, and the implications of this research noted.

Secondary to the above purpose, but no less important, was a study of developmental trends in the perception of ambiguous moving

stimuli. The trends observed were noted and discussed, and the importance of future studies in the area emphasized.

The following conclusions appear justified on the basis of the results of this investigation:

a. Schizophrenic patients do tend to respond to the test instrument in a manner not significantly different from children. However, it appears that the regression hypothesis as applied to schizophrenia requires modification in that regression on the variable studied was not to an infantile level of development but, rather, to somewhere approximating the pre-adolescent or adolescent level. If such is the case, future research in the behavior disorders might well focus attention upon "critical incidents" which occur during latency and adolescence rather than in early childhood in an effort to understand the fixations which develop.

b. Regression is not a complete backtracking to an earlier stage of development. The paranoid schizophrenics, for example, not only could not statistically be distinguished from nine to ten year old children on some scoring variables, but could not be differentiated from adolescents or adult controls on other scoring variables.

c. Development of perception as measured by the test instrument is fairly near completion by the age of nine or ten. On some of the scoring variables, however, development appeared to manifest a curvilinear relationship with age.

d. Because meaningful differences were observed between groups, it is felt that the test instrument is a valid one for differentiating between groups.

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APPENDIX A

SAMPLE PROTOCOLS FROM EACH OF THE NORMAL GROUPS

Since the PMS is a relatively new projective technique, some difficulty may be experienced in attempting to understand the nature of the scoring variables and the manner in which the protocols are scored. The examples which follow were not randomly selected, but purposely chosen because the scoring was rather straightforward and a wide range of scoring variables were used.

Protocol of a Four Year Old Child

Subject 22 was four years, nine months old at the time of testing. He obtained an IQ of 109 on the Ammons Full-Range Picture Vocabulary Test. His Warner Index of Social Status was 56. The complete protocol and scoring is as follows:

1. A gorilla. (Q) Parts came off of it. (Q) A tree. (Q) That's all. (Scored: Botany in III, Animal in IV, Change of Concept, Extensor Movement.)
2. That's a snake (Mentioned before completion of the sequence). Snake. (Q) Crocodile. (Q) The snake turned into a crocodile. (Q) It was crayfish. (Q) That's all. (Scored: three Animals in III, two Changes of Concept.)
3. A yard, a tree, a fox. A fox terrier. (Q) The tree broke into the fox. (Q) The fox broke into the tree. (Q) They changed into each other. (Scored: Animal in III, Botany in III, two Changes of

Concept.)

4. Eggs. (Q) Poison in 'em. (Q) Snails in 'em. (Q) Turtles in 'em. (Q) That was all. (Scored: Physiological in III.)

5. A camel. (Q) Trees and bridge. (Q) Camel broke in two pieces. (Q) The bridge did it -- broke. (Scored: Animate in I, Botany in III, Object in III, Animal in IV, Extensor Movement.)

6. An Indian and two Indian chiefs. (Q) Their heads broke. (Q) I don't know. (Scored: Human in IV, Extensor Movement.)

7. Cowboys and Indians. (Q) The Indian got shot. (Q) He died. (Scored: Human in I, Human in IV, Extensor Movement.)

8. A dog and a cat. (Q) The dog caught the cat and throwed him in a water puddle. (Q) That's all. (Scored: Animal in I, Animal in II, Flexor Movement, Extensor Movement.)

Protocol of a Nine Year Old Child

Subject 3 was nine years, four months old at the time of testing. She obtained an IQ of 120 on the Ammons Full-Range Picture Vocabulary Test. Her Warner Index of Social Status was 64. The complete protocol is as follows:

1. I don't know. (Q) The first part reminded me of a spider. (Q) Yeah, but I can't tell what it was. (Scored: Animal in III.)

2. It looked like an Indian tent with some trees moving around it. (Q) I guess the wind. (Scored: Botany in II, Inanimate in III, Diverse Movement.)

3. It looked like a mouse laying on the bed. A spider was

walking up to a -- to a horse, and it looked like the horse was standing on the end of the bed. (Q) And it looked like the spider was pulling on the horse. (Q) Umm ummm. (Scored: Animal in I, Flexor Movement, Extensor Movement.)

4. It looked like the spiders making a dog. And he's making rings around himself. (Q) I guess the spider was going to attacked (sic) him. (Q) No. (Scored: Animal in I, Animal in III, Diverse Movement.)

5. It looked like underwater where the crab is laying down and seaweeds over him. (Q) They were gathering it up and that one fell down under it. (Q) No. (Scored: Animal in I, Botany in II, Flexor Movement, Extensor Movement.)

6. The first part looked like a Indian going up to be hanged. But the next part looked like he was going up to a dog. (Q) And then the other one changed places and it looked like the Indian changed to a cat and the other one sort of a bear like dancing with him. (Q) Nope. (Scored: Human in I, Animal in I, Change of Concept, Flexor Movement, Extensor Movement.)

7. It looked like two ropes laying down and some bugs came and one rope broke and then the other one broke. And they tried to tie it on, but it broke again and some more bugs come along. (Q) I guess the bugs did because they circled around it. (Q) No. (Scored: Animal in I, Inanimate in IV, Diverse Movement, Flexor Movement, two Extensor Movements.)

8. At first it looked like it was a spider, but the second part

it looked like a spider breaking up, and in the third part it looked like a dog was laying down and some bugs were coming around something. And then they gathered around the dog. (Q) No. (Scored: Animal in I, Animal in IV, Change of Concept, Diverse Movement, Extensor Movement.)

Protocol of a Fifteen Year Old Child

Subject 2 was fifteen years, nine months old at the time of testing. She obtained an IQ of 103 on the California Test of Mental Maturity. Her Warner Index of Social Status was 53. The complete protocol is as follows:

1. It reminded me of two colotes fighting over something. Also an amoeba eating something. (Q) Nothing else. (Scored: two Animals in I, Change of Concept, Diverse Movement, Flexor Movement.)

2. A worm walking. Fish, busy at work. Some microscopic animal multiplying very rapidly. (Q) It reminded me of all of them. (Q) No, nothing else. (Scored: two Animals in I, Physiological in I, two Changes of Concept, three Extensor Movements.)

3. Trees blowing. An animal devouring food -- swallowing it in big chunks as though he were very hungry. (Q) It looked like both. (Q) Nothing else. (Scored: Animal in I, Botany in II, Change of Concept, Diverse Movement, Flexor Movement.)

4. A person shuffling cards, then dealing them and placing one in the middle to show what kind of cards they are to play. (Q) A bee, busy at work gathering nectar from the flowers. A ballerina, dancing and throwing flowers about. (Q) Nothing else. (Scored: two Humans

in I, Animal in I, Inanimate in II, two Changes of Concept, Diverse Movement, Flexor Movement, Extensor Movement.)

5. Stalagmites or stalactites growing very rapidly and then breaking off and falling. (Q) No. (Scored: Animate in I, Inanimate in IV, Flexor Movement, Extensor Movement.)

6. Two animals, very cautiously creeping up on one another. Then they have a fight to the bitter end. One of them is trying to run away, but he doesn't make it because the other tears him to pieces. (Q) Nothing else. (Scored: Animal in I, Animal in II, Animal in IV, two Diverse Movements, Flexor Movement.)

7. The stems of plants in water gradually being swayed back and forth. It looked as though they may have been eating. (Q) No, nothing else. (Scored: Animate in I, Botany in II, Diverse Movement, Flexor Movement.)

8. An amoeba, very scared and hungry. When he finally gets food, he ate it in a very big hurry. Then he stretched out and went about very slowly. (Q) It may have been a cat being barked at by a lot of dogs. Finally, the dogs tore him to pieces and left him out on the ground in a thousand pieces. (Q) Nothing else. (Scored: two Animals in I, Animal in II, Animal in IV, Change of Concept, Diverse Movement, Flexor Movement, Extensor Movement.)

Protocol of a Twenty-three Year Old Adult

Subject 21 was twenty-three years, eleven months old at the time of testing. He obtained an IQ of 105 on the Ammons Full-Range Picture

Vocabulary Test. His Warner Index of Social Status was 57. The complete protocol is as follows:

1. Bugs caught in a spider's web with the spider moving around trying to catch them, and then the bugs turned on the spider. (Q) No. (Scored: Animal in I, Diverse Movement.)

2. Grass that has been cut and raked up in a row. The wind starts blowing softly at first, and then starts blowing harder and scattering the grass. (Q) Not that I can think of. (Scored: Nature in I, Botany in II, Botany in IV, Diverse Movement, Extensor Movement.)

3. Two trees blowing in a windstorm, with the wind destroying one because it was rotten. (Q) Not that I can think of. (Scored: Nature in I, Botany in II, Botany in IV, Diverse Movement, Extensor Movement.)

4. An airplane flying and being shot at by anti-aircraft fire, with shells bursting behind it. (Q) They were trying to destroy it. (Q) Not that I can remember. (Scored: Chemico-physical in I, Machine in II, two Extensor Movements.)

5. Alligators moving in the water. (Q) Umm umm. (Scored: Animal in I, Extensor Movement.)

6. A man doing something. I can't make anything else out of it. (Scored: Human in I, Extensor Movement.)

7. Men telling jokes. They laughed so hard they both collapsed. (Q) Nothing else. (Scored: Human in I, Human in IV, two Extensor Movements.)

8. A pile of grass caught in a whirlwind with fire in the

background. A wind scattered grass into the fire. (Q) Umm umm.

(Scored: Nature in I, Chemico-physical in I, Botany in II, Diverse Movement, Flexor Movement, Extensor Movement.)

APPENDIX B

TABLE A

SEX OF EACH SUBJECT IN ALL GROUPS

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1	F	F	F	F	M	F	F
2	F	F	F	F	M	F	F
3	F	F	F	F	M	F	F
4	F	F	F	F	M	F	F
5	F	F	F	F	M	M	F
6	F	F	F	F	M	M	F
7	F	F	F	F	M	M	F
8	F	F	F	F	M	M	F
9	F	F	F	F	M	M	F
10	F	F	F	F	M	M	M
11	F	F	F	F	M	M	F
12	M	F	F	F	F	M	F
13	M	F	F	F	F	M	F
14	M	M	M	M	F	F	F
15	M	M	M	M	F	F	M
16	M	M	M	M	F	F	M
17	M	M	M	M	F	F	M
18	M	M	M	M	F	F	M
19	M	M	M	M	F	F	F
20	M	M	M	M	F	F	F
21	M	M	M	M	F	F	F
22	M	M	M	M	F	F	M
23	M	M	M	M	F	F	F
24	M	M	M	M	F	F	M
25	M	M	M	M	F	F	F

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The sex of each subject in the northern adult groups was obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE B
AGES FOR ALL SUBJECTS

S's	3-5	9-10	Ad	S N-A	N N-A**	S**	Pa**
1	4-2***	8-11	15-6	23-9	28	43	48
2	4-9	10-0	15-9	24-0	34	37	37
3	3-10	9-4	15-11	21-5	32	31	36
4	4-0	9-8	15-11	25-7	33	22	35
5	4-8	9-3	15-10	35-3	55	26	44
6	3-11	9-7	15-9	28-0	39	31	41
7	4-8	9-6	15-7	23-1	43	42	25
8	3-6	9-8	15-5	22-11	38	21	38
9	4-8	9-8	15-7	28-7	26	50	46
10	4-2	9-9	15-11	46-4	36	33	31
11	3-0	9-9	15-6	36-10	33	41	37
12	3-8	9-6	15-0	46-1	30	32	25
13	4-8	9-5	15-2	44-5	37	26	44
14	3-10	9-0	15-2	47-3	38	29	55
15	4-8	9-6	15-9	40-0	30	38	40
16	4-3	9-0	15-11	47-11	21	49	31
17	4-3	9-0	15-11	37-9	20	32	34
18	4-4	9-7	15-3	53-3	45	28	39
19	4-11	9-7	15-2	41-5	22	32	31
20	4-6	9-4	15-1	25-5	25	23	31
21	4-9	9-10	15-2	23-11	35	22	39
22	4-9	9-7	15-8	27-0	19	40	48
23	4-0	9-11	15-4	22-11	20	24	46
24	4-11	9-9	15-5	27-3	25	28	23
25	3-9	9-10	15-9	26-11	21	37	18

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The ages by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

***Expressed in years and months. Thus, 4-2 signifies the subject is four years and two months old at the time of testing.

TABLE C

SOCIAL CLASS EQUIVALENTS FOR EACH SUBJECT IN ALL GROUPS

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1	60	55	58	65	67	63	57
2	60	71	53	43	65	57	52
3	53	66	60	40	54	58	67
4	62	66	49	55	57	39	58
5	58	57	62	49	51	63	60
6	60	62	65	44	64	60	47
7	64	53	44	50	64	65	68
8	49	48	58	57	60	62	70
9	60	63	60	57	65	60	72
10	49	42	55	53	60	63	68
11	57	58	53	64	57	65	65
12	62	58	57	60	63	57	62
13	62	44	62	62	55	57	53
14	60	43	44	62	60	65	50
15	56	65	49	65	60	62	70
16	60	51	58	60	55	68	55
17	60	33	58	64	64	59	63
18	43	68	64	57	44	46	63
19	48	62	62	54	51	65	49
20	68	51	44	59	59	58	62
21	71	65	60	57	54	59	63
22	58	34	51	57	53	54	68
23	55	65	62	60	65	59	63
24	66	46	51	58	54	62	49
25	51	64	58	57	43	59	62

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores for each subject in the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE D
INTELLIGENCE QUOTIENTS FOR EACH
SUBJECT IN ALL SOUTHERN GROUPS*

S's	3-5**	9-10	Ad	N-A
1	108	106	96	110
2	109	115	103	100
3	112	120	103	105
4	113	114	100	112
5	100	124	103	109
6	105	101	106	107
7	84	126	110	114
8	143	109	102	110
9	96	98	96	103
10	120	111	110	112
11	110	111	109	97
12	123	111	94	95
13	107	111	104	91
14	125	133	111	95
15	92	137	94	97
16	113	106	102	93
17	113	117	100	93
18	104	110	98	112
19	116	120	101	110
20	96	106	98	109
21	105	110	91	105
22	109	108	114	110
23	103	121	96	98
24	102	97	93	120
25	115	114	122	118

*The adolescent group received the California Test of Mental Maturity. All other groups received the Ammons Full-Range Picture Vocabulary Test.

**The groups are designated as follows: Ad for adolescents, and N-A for southern control adults. Child groups are designated by chronological age.

APPENDIX C

TABLE A

MEASURES OF CENTRAL TENDENCY AND VARIABILITY FOR
VARIABLES USED IN THE STUDY OF DEVELOPMENT AND REGRESSION

THREE TO FIVE YEAR OLDS

SCORING VARIABLES	Median	Range	Mean	Standard Deviation
Human in I	0.0	0-1	.20	.40
Nature in I	0.0	0-1	.04	.20
Total Nature	0.0	0-3	.56	.80
Change of Concept	0.0	0-5	.72	1.11
Total Inanimate	1.00	0-4	1.16	1.08
Animal in IV	0.0	0-4	.40	.94
Movement Level IV	0.0	0-6	1.16	1.64
Physiological in I	0.0	0-0	0.0	0.0
Total Physiological	0.0	0-2	.36	.56
Inanimate in II	0.0	0-2	.20	.49
Total Human	0.0	0-7	1.00	1.67
Total Chemico- physical	0.0	0-1	.04	.20
Movement Level I	2.57	0-9	2.68	2.83
Movement Level II	0.0	0-7	1.20	2.04
Flexor Movement	0.0	0-9	1.24	2.26
Content Categories	3.81	2-6	3.88	1.18
Scorable Responses	9.40	2-19	9.64	4.38
Movement Level III	4.33	0-12	4.64	3.06

TABLE B

MEASURES OF CENTRAL TENDENCY AND VARIABILITY FOR
VARIABLES USED IN THE STUDY OF DEVELOPMENT AND REGRESSION

NINE TO TEN YEAR OLDS				
SCORING VARIABLES	Median	Range	Mean	Standard Deviation
Human in I	0.0	0-5	.80	4.00
Nature in I	0.0	0-3	.28	.72
Total Nature	0.0	0-4	.92	1.20
Change of Concept	3.00	0-13	4.08	3.84
Total Inanimate	1.94	0-6	2.24	1.68
Animal in IV	.55	0-3	.64	.74
Movement Level IV	1.67	0-5	1.72	1.22
Physiological in I	0.0	0-4	.64	1.02
Total Physiological	0.0	0-5	.84	1.32
Inanimate in II	.86	0-3	1.00	.98
Total Human	.95	0-6	1.52	1.81
Total Chemico- physical	0.0	0-3	.40	.74
Movement Level I	6.00	2-13	6.56	3.32
Movement Level II	2.00	0-9	2.68	2.36
Flexor Movement	3.00	0-11	3.80	3.31
Content Categories	4.89	3-8	5.00	1.20
Scorable Responses	14.13	6-24	14.72	4.78
Movement Level III	2.75	0-12	3.84	3.47

TABLE C
MEASURES OF CENTRAL TENDENCY AND VARIABILITY FOR
VARIABLES USED IN THE STUDY OF DEVELOPMENT AND REGRESSION

ADOLESCENTS				
SCORING VARIABLES	Median	Range	Mean	Standard Deviation
Human in I	1.25	0-5	1.90	1.37
Nature in I	0.0	0-3	.28	.72
Total Nature	.69	0-2	.68	.62
Change of Concept	.84	0-7	1.44	1.84
Total Inanimate	1.00	0-4	1.12	.99
Animal in IV	0.0	0-2	.36	.62
Movement Level IV	.95	0-6	1.28	1.40
Physiological in I	.69	0-2	.52	.64
Total Physiological	.69	0-2	.68	.62
Inanimate in II	.69	0-3	.72	.72
Total Human	1.57	0-6	1.76	1.72
Total Chemico- physical	0.0	0-3	.56	.85
Movement Level I	7.57	3-14	7.36	2.44
Movement Level II	2.25	0-6	2.52	1.62
Flexor Movement	2.38	0-9	2.80	1.98
Content Categories	5.44	3-8	5.40	1.10
Scorable Responses	11.63	7-22	12.24	3.59
Movement Level III	0.0	0-6	1.08	1.74

TABLE D

MEASURES OF CENTRAL TENDENCY AND VARIABILITY FOR
VARIABLES USED IN THE STUDY OF DEVELOPMENT AND REGRESSION

SOUTHERN ADULT CONTROLS

SCORING VARIABLES	Median	Range	Mean	Standard Deviation
Human in I	1.06	0-4	1.16	1.04
Nature in I	1.13	0-4	1.28	1.28
Total Nature	1.44	0-4	1.72	1.31
Change of Concept	.80	0-5	1.44	1.70
Total Inanimate	1.14	0-4	1.44	1.36
Animal in IV	0.0	0-2	.36	.56
Movement Level IV	1.31	0-4	1.40	1.10
Physiological in I	0.0	0-3	.52	.90
Total Physiological	0.0	0-3	.52	.90
Inanimate in II	0.0	0-4	.92	1.16
Total Human	1.58	0-5	1.60	1.54
Total Chemico- physical	.56	0-4	.80	.98
Movement Level I	7.14	3-12	7.40	2.04
Movement Level II	2.67	0-7	2.68	2.00
Flexor Movement	2.56	0-5	2.36	1.32
Content Categories	5.04	3-7	5.12	.99
Scorable Responses	12.88	7-18	12.32	3.04
Movement Level III	.86	0-9	1.52	2.29

TABLE E

MEASURES OF CENTRAL TENDENCY AND VARIABILITY FOR
VARIABLES USED IN THE STUDY OF DEVELOPMENT AND REGRESSION

NORTHERN ADULT CONTROLS

SCORING VARIABLES	Median	Range	Mean	Standard Deviation
Human in I	1.13	0-7	1.68	1.85
Nature in I	.85	0-3	1.04	1.04
Total Nature	1.00	0-4	1.20	1.10
Change of Concept	1.45	0-4	1.52	1.24
Total Inanimate	1.63	0-5	2.08	1.52
Animal in IV	0.0	0-2	.54	.32
Movement Level IV	1.31	0-4	1.40	1.10
Physiological in I	0.0	0-3	.52	.90
Total Physiological	0.0	0-3	.60	.98
Inanimate in II	.75	0-5	1.24	1.48
Total Human	1.88	0-13	2.72	2.98
Total Chemico- physical	0.0	0-4	.52	.90
Movement Level I	7.29	4-14	7.52	2.18
Movement Level II	2.67	0-7	3.24	1.86
Flexor Movement	3.33	2-7	3.64	1.55
Content categories	5.55	4-7	5.44	.94
Scorable Responses	13.71	9-23	13.76	2.00
Movement Level III	1.56	0-7	1.68	1.62

TABLE F

MEASURES OF CENTRAL TENDENCY AND VARIABILITY FOR
VARIABLES USED IN THE STUDY OF DEVELOPMENT AND REGRESSION

UNDIFFERENTIATED SCHIZOPHRENICS

SCORING VARIABLES	Median	Range	Mean	Standard Deviation
Human in I	.82	0-5	1.12	1.34
Nature in I	0.0	0-3	.36	.68
Total Nature	0.0	0-4	.48	.90
Change of Concept	1.83	0-8	2.40	2.29
Total Inanimate	3.00	0-11	3.36	2.70
Animal in IV	0.0	0-2	.32	.54
Movement Level IV	1.81	0-8	2.12	2.12
Physiological in I	0.0	0-6	1.08	1.49
Total Physiological	.60	0-7	1.16	1.62
Inanimate in II	2.00	0-8	2.16	2.01
Total Human	1.91	0-10	2.12	2.23
Total Chemico- physical	0.0	0-2	.40	.69
Movement Level I	7.00	0-13	6.60	3.36
Movement Level II	3.75	0-8	3.52	2.21
Flexor Movement	4.83	1-9	4.76	2.10
Content Categories	4.80	1-8	4.80	1.60
Scorable Responses	13.75	8-26	13.84	4.33
Movement Level III	1.06	0-7	1.60	1.76

TABLE G
MEASURES OF CENTRAL TENDENCY AND VARIABILITY FOR
VARIABLES USED IN THE STUDY OF DEVELOPMENT AND REGRESSION

PARANOID SCHIZOPHRENICS

SCORING VARIABLES	Median	Range	Mean	Standard Deviation
Human in I	0.0	0-5	1.16	1.59
Nature in I	.56	0-4	.80	1.02
Total Nature	.69	0-4	1.00	1.17
Change of Concept	5.75	0-20	5.88	5.11
Total Inanimate	3.80	0-8	3.64	1.87
Animal in IV	.71	0-3	.80	.85
Movement Level IV	2.14	0-6	2.40	1.67
Physiological in I	1.60	0-8	2.00	1.96
Total Physiological	2.00	0-8	2.40	2.08
Inanimate in II	2.13	0-6	2.12	1.53
Total Human	0.0	0-8	1.92	2.48
Total Chemico- physical	0.0	0-3	.60	.90
Movement Level I	7.25	2-15	7.84	4.00
Movement Level II	3.63	0-8	3.44	2.14
Flexor Movement	4.00	0-7	3.68	2.13
Content Categories	5.20	3-8	5.28	1.46
Scorable Responses	14.33	8-31	15.92	6.10
Movement Level III	1.25	0-9	2.24	2.48

APPENDIX D

TABLE A

RAW SCORES FOR ALL SUBJECTS: HUMAN IN I

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1			2	1	3	1	3
2		1	2	2			5
3		1		4	1		2
4							
5				1	1	5	4
6				1	3	2	
7		3	2			1	
8		5	3	1		2	
9	1	1	2	2			3
10			1	1	5	2	
11			3		4		2
12		3	1	2	2		
13		2	2		1		
14			4	2	3	4	
15			1	1	4	2	
16	1				7		
17			2	3		3	
18			2		1	1	
19			1	2			
20	1	1	2			2	1
21	1	1		2	1	1	
22	1			1	3		
23			5	1		2	
24		2		2	1	1	4
25					2	1	3

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE B

RAW SCORES FOR ALL SUBJECTS: NATURE IN I

S's	3-5	9-10	Ad	S N-A	N N-A**	S**	Pa**
1				2			
2		3		2		3	2
3					1		1
4				2	1		1
5			1	1	1		
6							1
7			1		2		
8		2	1	1	3		1
9					1		
10		1	1	2	3		
11				2			2
12				1			1
13			2		1	1	
14				4	1		
15				1			1
16			1		1	1	1
17			2		3		1
18			1	3	1	1	
19					2	1	4
20			1	4	3		
21				3	1	1	
22			3	2			
23			1		1		
24	1	1	4			1	1
25			2	2			

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissesation (24).

TABLE C

RAW SCORES FOR ALL SUBJECTS: TOTAL NATURE

S's	3-5	9-10	Ad	S N-A	N N-A	S**	Pa**
1		1	1	3			
2	1	3		3		4	3
3					1		1
4		1		2	1		1
5	1	2	3	1	1		
6			1				1
7		1	2	1	2		1
8	1	3	1	1	3		1
9	1	1	1	1	1		
10	1	3	3	2	3		
11		1		2		1	3
12			2	1	1		1
13			3		1	1	
14	2			4	1		
15			1	1			2
16		2	3		2	1	1
17			2	1	3		1
18	1		1	4	1	1	
19		4			2	1	4
20			4	4	4		
21	3		1	3	1	2	
22			3	3			
23			2	1	1		
24	1	1	4	3		1	2
25	2		2	2	1		3

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE D

RAW SCORES FOR ALL SUBJECTS: CHANGE OF CONCEPT

S's	3-5	9-10	Ad	S N-A	N N-A	S**	Pa**
1		4	2		3	1	8
2			7	2	1		10
3		2	4		1		6
4	2	2	1				1
5	2	1	1	2	2	2	2
6				3		5	
7		13			3	1	1
8		8	1			8	
9		3	4	4	2		2
10		4	1	4	2	4	
11	1				4	1	9
12	1	8		1	2		13
13		3	1			4	11
14		13	1	1	3	3	1
15		9		1	3	2	1
16	1	8	1		3		6
17		1		1	1	4	5
18	1	4				1	1
19		6	1		1	4	3
20	2		5	5		4	5
21	1	1	1		1	5	11
22	5	1	1	1			2
23	1	1	4	4	1		8
24		3		5	3	5	13
25	1	7		2	2	6	20

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE E

RAW SCORES FOR ALL SUBJECTS: TOTAL INANIMATE

S's	3-5	9-10	Ad	S N-A	N N-A	S**	Pa**
1		6			1	6	5
2	1		2		1	1	5
3	1	2	1	3		3	2
4	3	2			1	8	2
5	2	3	1	1	5	3	4
6		3	2	1	3		5
7	1	1			2	2	6
8		5	1	1	3	3	4
9	1	2	2	4			1
10			1	2		11	5
11	2	1	1	1	4	7	3
12	2	2	2	3	1	1	
13	3	2	2	1	5	4	3
14		5		4	3	2	3
15	1	2	1	1	2	5	6
16	2	3	3	4	1	3	5
17		1			1	5	5
18	4	6		1	1		
19	1	2	1		4	3	2
20	1	1	1	2	1		3
21	1		4		1	4	2
22	1	1	1	2	4	6	4
23	2	3	1		2	4	4
24		1	1	2	2	1	4
25		2		3	4	2	8

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE F

RAW SCORES FOR ALL SUBJECTS: ANIMAL IN IV

S's	3-5	9-10	Ad	S N-A	N N-A**	S**	Pa**
1		1	1		1		1
2			2	1	1	1	1
3	1	1	1				
4	2		1	1			
5		3				2	
6			1			4	1
7		1		1		1	
8			1				1
9	1						2
10							
11							1
12		1			1		
13	4			1			1
14		2			1	1	
15		1					
16				1			3
17						1	1
18		1			2	1	1
19		1			1		1
20				1	1	1	1
21		1					1
22	2	1					
23		1	2	2			3
24		1		1			
25							1

s N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE G

RAW SCORES FOR ALL SUBJECTS: MOVEMENT LEVEL IV

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1	1	5	3	2	3	2	3
2			3	1	1	2	2
3	1	2	1	1	1	2	2
4	3		1	1	1		4
5		5	1			7	1
6			1			5	5
7		3	1	1		3	1
8		2	2	1	1	2	2
9	3		3	2	2		6
10		1	1			1	1
11		1			1	5	2
12		2			1		
13	6	1	1	1		3	1
14		2	1		4	3	
15		2	1		1	2	
16	3	1	3	1	2		6
17	1			1		2	2
18		3			2	1	1
19		3	2		2	8	3
20	4	1		1	2	2	4
21	1	1	1	2	3		3
22	4	2			1		2
23	1	2	6	2	2	2	3
24		2		1	3	1	2
25	1	2			2		4

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE H

RAW SCORES FOR ALL SUBJECTS: PHYSIOLOGICAL IN I

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1			1		3		4
2			1		1		2
3					1		
4		1	1	1			1
5				1		1	3
6		2	1			1	3
7		1			1		2
8				1		1	
9						4	
10		2	2	1			
11		1					1
12						2	8
13			1	3		2	2
14		1					4
15		2	1				
16			1				
17		2	1	3	1		
18			2	1		2	2
19				2		3	1
20			1			2	4
21			1		2	2	5
22			1				1
23			1		1	1	1
24		4			3	6	2
25			1				4

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE I

RAW SCORES FOR ALL SUBJECTS: TOTAL PHYSIOLOGICAL

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1		1	1		3		6
2			1		1		4
3					1		1
4		1	1	1			3
5				1		1	3
6	1	2	1			1	3
7		2			1		2
8				1		1	
9					1	4	
10	1	5	2	1			
11		1					1
12	1					2	8
13	1		1	3		2	3
14	2	1				1	4
15		2	1				
16			1				
17		2	1	3	1		1
18			2	1		2	2
19	1			2		3	1
20			1			2	4
21			1		3	2	5
22	1		1				1
23	1		1		1	1	1
24		4			3	7	2
25			1				5

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE J

RAW SCORES FOR ALL SUBJECTS: INANIMATE IN II

S's	3-5*	9-10	Ad	S N-A	N N-A	S**	Pa**
1		2			1	4	3
2			1		1		1
3				2		3	
4	1	2				8	2
5		2	1	1	3	2	3
6			2		2		1
7					1	2	5
8		2	1	1	2	1	3
9		1		2			1
10						5	4
11			1	1	4	2	2
12		1	1	1			
13		1	1		5	2	2
14		3		4	1	2	3
15			1			3	6
16	2	2	1	3		3	3
17		1				3	3
18		3		1	1		
19	1	1	1		3	1	
20			1	2			1
21	1		3			3	1
22		1	1	2	4	6	3
23		2	1			3	2
24		1	1		1		1
25				3	2	1	3

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE K

RAW SCORES FOR ALL SUBJECTS: TOTAL HUMAN

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1	7		5	1	5	2	3
2	1	1	2	2			6
3	2	1	1	4	2	3	3
4							2
5		1		1	2	4	3
6				2	4	3	
7		6	2			2	
8		6	3	1		3	
9	2	1	3	2			8
10			1	2	6	4	
11		1	4		4		3
12		5	1	1	2		
13		2	2		1		1
14		3	5	4	4	5	
15		1	1	3	7	2	
16	3				13	1	
17			2	5		3	
18		1	2		1	2	
19	1		2	2		2	
20	4	1	2		3	5	2
21	1	1		3	1	2	
22	3			2	6		
23		1	6	4	1		3
24	1	2		3	2	1	6
25		4			4	3	7

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE I

RAW SCORES FOR ALL SUBJECTS: TOTAL CHEMICO-PHYSICAL

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1				2	1		
2				2	1		1
3				1	1	2	1
4				1	2		
5		1				2	
6						1	1
7		3		4	1		
8			3	1			
9		2		1	4		1
10				1	1		2
11			1		1		3
12				1			1
13			1				
14		1	2	1			
15			1		1		
16		1		2			
17	1						1
18			1			2	
19			2	1		1	
20			1				
21		1	2	2			
22							
23		1					1
24						1	3
25						1	

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE M

RAW SCORES FOR ALL SUBJECTS: MOVEMENT LEVEL I

S's	3-5*	9-10	Ad	N-A	N-A**	S**	Pa**
1	6	5	6	7	14	6	12
2		7	14	7	10	6	10
3	3	7	7	6	9	2	4
4	7	4	9	7	5		5
5		2	3	9	4	12	10
6		5	4	3	7	9	7
7	3	13	6	7	7	7	4
8		10	8	5	7	6	3
9	3	6	6	6	7	8	5
10		4	5	10	11	7	2
11	1	2	9	7	7		13
12	12	12	15	10	6	8	11
13	9	9	8	9	4	5	12
14	3	2	8	8	9	9	10
15		9	5	6	8	5	2
16	8	12	8	8	10	4	5
17	1	5	8	12	7	8	6
18		6	8	6	8	10	5
19	1	3	5	7	5	13	7
20	8	3	11	11	7	9	8
21	4	7	10	9	8	8	13
22	3	9	7	8	8	2	2
23		6	11	4	6	3	12
24	3	12	8	7	6	11	13
25	3	4	5	6	8	7	15

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE N

RAW SCORES FOR ALL SUBJECTS: MOVEMENT LEVEL II

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1	7	6	5	5	2	4	3
2	2	1	5	1	2	1	4
3		2		6	2	4	
4	1	5	2		3	8	7
5		5	6	3	7	2	3
6			4	1	3	1	1
7		1	1	1	2	2	5
8		4	2	2	2	5	3
9		1		4	2	4	1
10			3	3	1	8	5
11			3	4	4	2	2
12		3	1	1	4		
13	4	2	1		5	2	4
14	1	6	3	5	1	5	6
15			2		2	5	8
16	4	2	3	5	4	5	5
17	1	1	1	3	4	3	5
18		5	1	1	2	4	2
19	7	9	4	1	6	4	
20	1	5	5	4	6		1
21	1	1	4	4	2	6	4
22	1	2	2	4	5	6	5
23		4	2	1		4	7
24		2	1	1	3		1
25			2	7	7	3	4

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE O

RAW SCORES FOR ALL SUBJECTS: FLEXOR MOVEMENT

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1	9	3	5	3	5	4	7
2	2	2	7	1	3	1	1
3		4	4	5	4	5	2
4	1	4	4	4	3	6	1
5		2	5	2	3	5	7
6		1	2	1	5	9	8
7	1	1	3	3	2	5	5
8		4	2	2	5	3	1
9	1	1	1	3	2	6	2
10		1		3	3	8	2
11	1	1	1	1	7	3	5
12		10	1	1	5	4	4
13		4	3	3	2	2	2
14			2	5	2	9	4
15		1	1	3	4	3	3
16	5	11	3	3	5	2	4
17	1	1	2	3	2	3	6
18		10	2	1	2	7	1
19	7	10	3	2	7	6	
20	1	4	2	1	2	3	5
21	1	3	9	1	2	3	7
22	1	9	2	3	3	5	2
23		4	1		3	5	6
24		3	3	4	5	5	5
25		1	2	1	5	7	6

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE P

RAW SCORES FOR ALL SUBJECTS: NUMBER OF CONTENT CATEGORIES

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1	3	5	5	5	7	4	6
2	5	4	6	5	5	4	8
3	4	4	5	5	6	4	7
4	3	5	3	6	5	1	7
5	3	6	4	6	6	5	5
6	2	3	5	4	4	5	5
7	3	8	4	3	6	4	4
8	3	6	6	7	4	6	4
9	5	7	5	7	5	4	5
10	4	4	6	7	4	5	3
11	2	6	5	5	6	2	7
12	3	5	6	5	6	5	4
13	4	4	7	5	4	6	6
14	6	7	5	5	5	6	4
15	2	5	6	4	6	5	3
16	5	5	6	5	6	6	6
17	3	3	5	4	6	4	6
18	4	5	6	5	5	7	4
19	6	5	6	5	5	8	4
20	4	4	8	5	5	4	5
21	5	4	7	6	7	6	5
22	6	4	5	5	4	2	3
23	4	5	6	4	7	4	7
24	4	6	4	6	6	7	7
25	4	5	4	4	6	6	7

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE Q

RAW SCORES FOR ALL SUBJECTS: NUMBER OF SCORABLE RESPONSES

S's	3-5*	9-10	Ad	S N-A	N N-A**	S**	Pa**
1	14	18	16	14	21	16	21
2	7	7	22	10	14	13	25
3	10	14	14	13	13	9	11
4	13	10	12	8	9	8	17
5	9	12	10	14	15	22	14
6	2	9	9	7	14	16	13
7	7	24	10	9	10	12	11
8	4	21	12	8	10	15	9
9	10	13	15	12	11	12	14
10	6	12	10	15	12	23	8
11	3	10	12	12	14	8	19
12	12	20	10	13	14	9	11
13	19	14	11	11	9	11	21
14	9	22	13	14	16	17	16
15	3	19	9	9	14	12	10
16	16	20	14	14	23	9	21
17	10	6	9	17	13	15	15
18	9	16	9	9	12	16	9
19	9	19	12	8	14	26	10
20	16	10	18	16	17	15	14
21	11	10	15	15	14	17	21
22	17	14	9	13	16	8	9
23	9	14	19	15	10	9	26
24	6	16	9	18	12	14	22
25	10	18	7	15	19	14	31

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

**The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation (24).

TABLE R

RAW SCORES FOR ALL SUBJECTS: MOVEMENT LEVEL III

S's	3-5*	9-10	Ad	S N-A	N N-A***	S**	Pa**
1		2	2		2	4	3
2	5			1	1	4	9
3	6	3	6		1	1	5
4	2	1					1
5	9			1	4	1	
6	2	4		3	4	1	
7	4	8	2		1		1
8	4	5				2	1
9	4	6	6				2
10	6	7	1	2		7	
11	2	7		1	2	1	2
12	12	3	4	2	3	1	
13		2	1	1		1	4
14	5	12	1	1	2		
15	3	8	1	3	3		
16	1	5			7		5
17	7			1	2	2	2
18	9	2		2		1	1
19	1	4	1		1	1	
20	3	1	2		2	4	1
21	5	1			1	3	1
22	9	1		1	2		
23	8	2		8	2		4
24	3			9		2	6
25	6	12		2	2	4	8

S N

*The groups are designated as follows: N-A and N-A for the southern and northern normal adult control groups, respectively; S for undifferentiated schizophrenics; Pa for paranoid schizophrenics; and Ad for adolescents. Child groups are designated by chronological age.

***The raw scores by subject for the northern adult groups were obtained from the data provided in William H. Lundin's doctoral dissertation.

VITA

Name: Frank Joseph Loeffler, Jr.

Born: Chicago, Illinois; February 6, 1926.

Education: A.B., University of Illinois, 1949.
M.S., University of Illinois, 1951.

Positions: Intern, Chicago State Hospital; February, 1951
to December, 1951.

Staff Psychologist, Chicago State Hospital;
December, 1951 to September, 1952.

Graduate Assistant, Louisiana State University
(at Louisiana State University School of Medicine);
September, 1952 to September, 1953.

Graduate Assistant, Louisiana State University (at
Baton Rouge Campus); September, 1953 to July, 1954.

Publications: An analysis of co-therapist interaction in group
psychotherapy. Int. J. grp. Psychother., 1953, 3,
171-180. (With A. Solomon, and G. H. Frank)

The co-therapist method: special problems and
advantages. Grp. Psychother., 1954, 6, 189-192.
(With H. Weinstein)

Professional Organizations: Associate, American Psychological
Association (Divisions 8 and 12).

Associate, Midwestern Psychological Association.